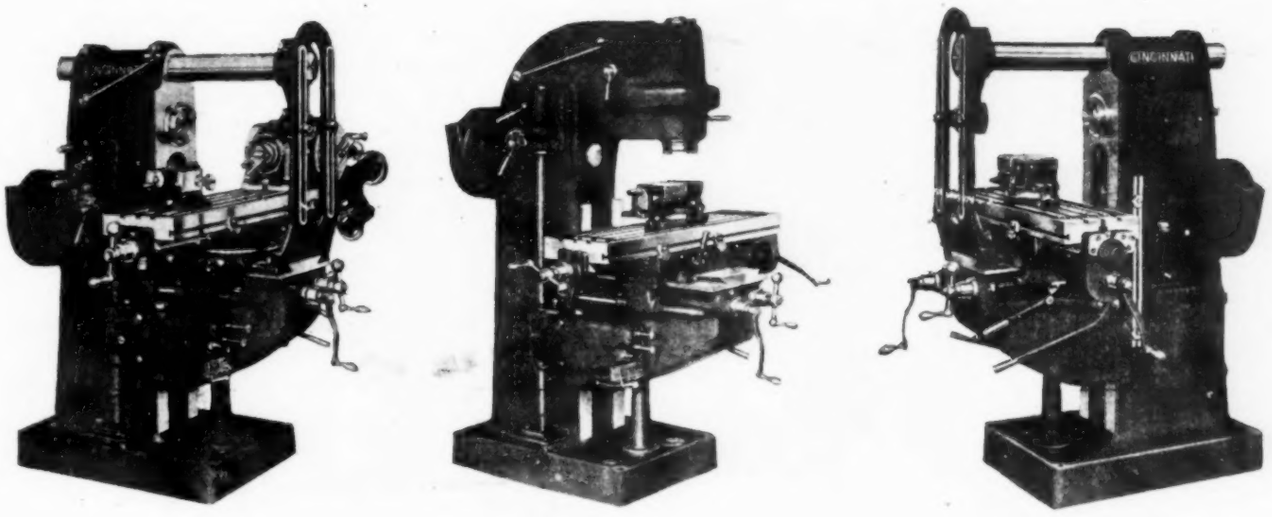
October 23, 1919 American Machinist Vol. 51, No. 17



The Cincinnati M-Type Milling Machine

By JOHN H. VAN DEVENTER
Editor-in-Chief, *American Machinist*

Partaking of the characteristics of both the Cincinnati 18-in. plain manufacturing milling machine and the No. 5 high-power milling machine, this new M-type produced by the Cincinnati Milling Machine Co. is made in two sizes, Nos. 1 and 2, and in three forms, plain, universal and vertical. They are all of the constant-speed type, and present rather unusual features in design.

ENVIRONMENT and association affect individuals in marked degree, and hardly less do they affect machines. Every worth-while machine tool is pedigreed and its ancestral features can be traced step by step back through past generations.

In the case of the machines described in this article, the geneology is evident to one who knows machine tools. One of the characteristic family marks is evident in the shallow-section column. When all milling machines were of the cone-pulley, belt-driven type, it was necessary to provide a column deep enough to get the cone pulley between the two main bearings, and when the gear-driven, constant-speed pulley type made its appearance, it inherited this deep-section column. People thought that this deep section was needed for rigidity. That it was not, was proved by the Cincinnati Milling Machine Co.'s experience with its 18-in. plain manufacturing machine, originally made as a munition tool and having a single-pulley drive. In these machines the depth of section of the column was not made according to the old standard of design, but was reduced to the span of the single-step pulley plus two generous bearings. The experience of users of several thousand of these machines on munition work proved conclusively that the old ideas of deep column sections were superfluous.

From this machine also, the M-type milling machines inherited the strong, wide and solid knee, with its large support for the saddle, shown in Fig. 1.

From its larger brother, the No. 5 high-power milling machine, this new M-type inherits its speed-change mechanism, consisting of sliding gears, and its feed-change mechanism at the side of the knee, with the change levers at the front within reach of the operator. These features are clearly shown in the engravings in the headpiece.

The driving pulley is at the rear of the machine, inclosed by an adjustable belt guard. Its width is such that a belt pull of 40 lb. per inch is designed to deliver the rated horsepower to the machine. This was selected as the basis for the design, with a view of prolonging the life both of belt and bearings.

The drive is through an adjustable friction-disk clutch, and the power is transmitted from the first shaft to the spindle through a train of hardened-steel gears and hardened shafts. The gear ratios in the drive are so arranged that there is always a reduction in speed through the entire gear train. In connection with the drive, it is of interest to note that in addition to the Cincinnati standard flange on the spindle, standardization has been carried a step further by putting into these small machines the large No. 14 standard taper hole, which has been adopted for the Nos. 4 and 5 sizes. This is for the purpose of allowing interchangeability

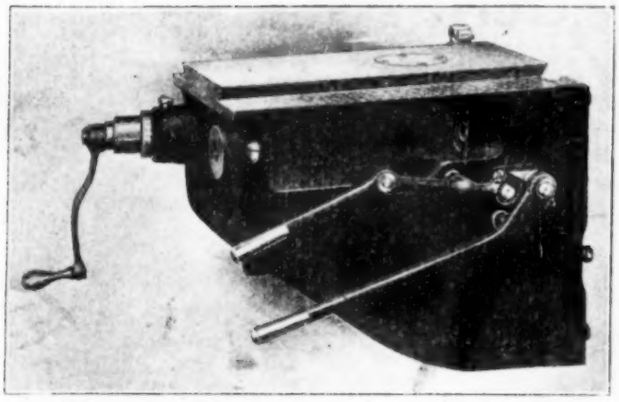


FIG. 1. KNEE OF THE M-TYPE CINCINNATI MILLING MACHINE

of arbors, and has the further advantage of increasing the driving strength of the arbor.

All of the speed changes are made by the three levers shown at the left in Fig. 2. Numbers representing the different speeds are placed in a circular arrangement on the direct-reading, speed-index plate. Each circle contains one series of speeds in sequence. Thus three changes in each series are available by shifting the lower lever only. Four series, making 12 speeds in all, are available through combinations of the upper two levers in the positions *A*, *B*, *C* and *D*. As shown in this illustration, the speed is set at 316 revolutions per minute.

The feed is driven from the main driving shaft through beveled gears, to a vertical shaft, which connects the spindle-drive box and the feed box. This vertical shaft is square, and the drive from it to the feed box is through spur gears, and from these through miter gears, which are also the feed reverse gears to the feed-change mechanism.

As shown in the illustrations, the vertical feed shaft is completely inclosed by telescopic tubes, which automatically adjust themselves to various positions of the table.

The exterior of the feed box is shown in Fig. 2 at the right, and the interior with the change gears is shown in Fig. 3. Referring to Fig. 2, it will be noted that there is a swinging lever at the bottom, giving three changes of feed in each of four series of com-

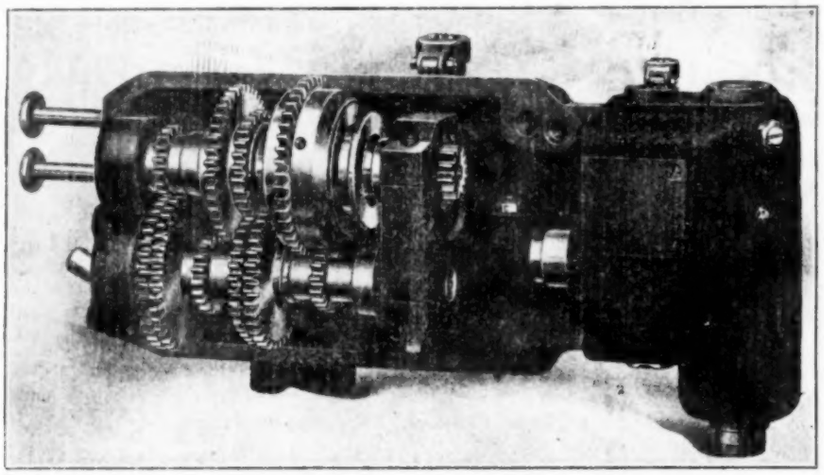


FIG. 3. REAR VIEW OF FEED-CHANGING UNIT, SHOWING GEARING

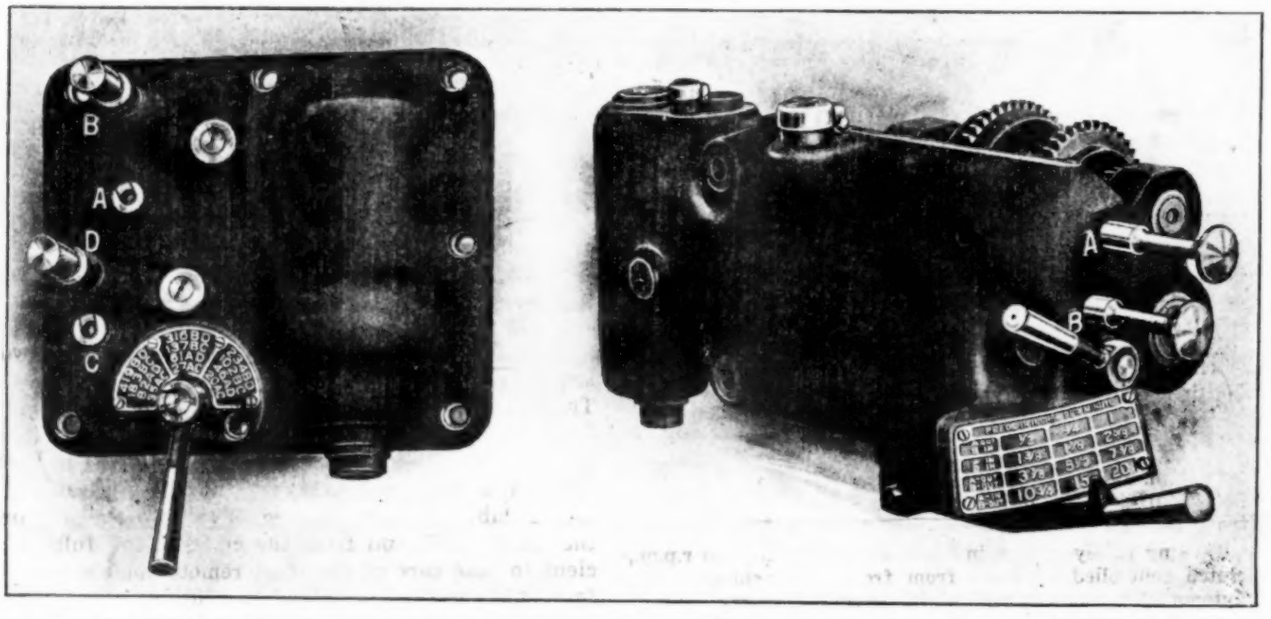


FIG. 2. AT LEFT AND RIGHT RESPECTIVELY, EXTERIOR VIEWS OF SPEED- AND FEED-CHANGING UNITS

binations of the knobs *A* and *B*. As shown in this illustration, the feed is set at $\frac{3}{4}$ in. per minute. These machines are regularly furnished with feeds from $\frac{1}{2}$ in. per minute to 20 in. per minute, but slower series, from $\frac{5}{16}$ in. to 12 in., or faster series, from $\frac{3}{4}$ in. to 30 in., can be obtained by inserting suitable change gears at the top of the feed box. The incorporation of the feed box in the knee does away with the use of universal joints, and permits of the direct transmission of power for this purpose.

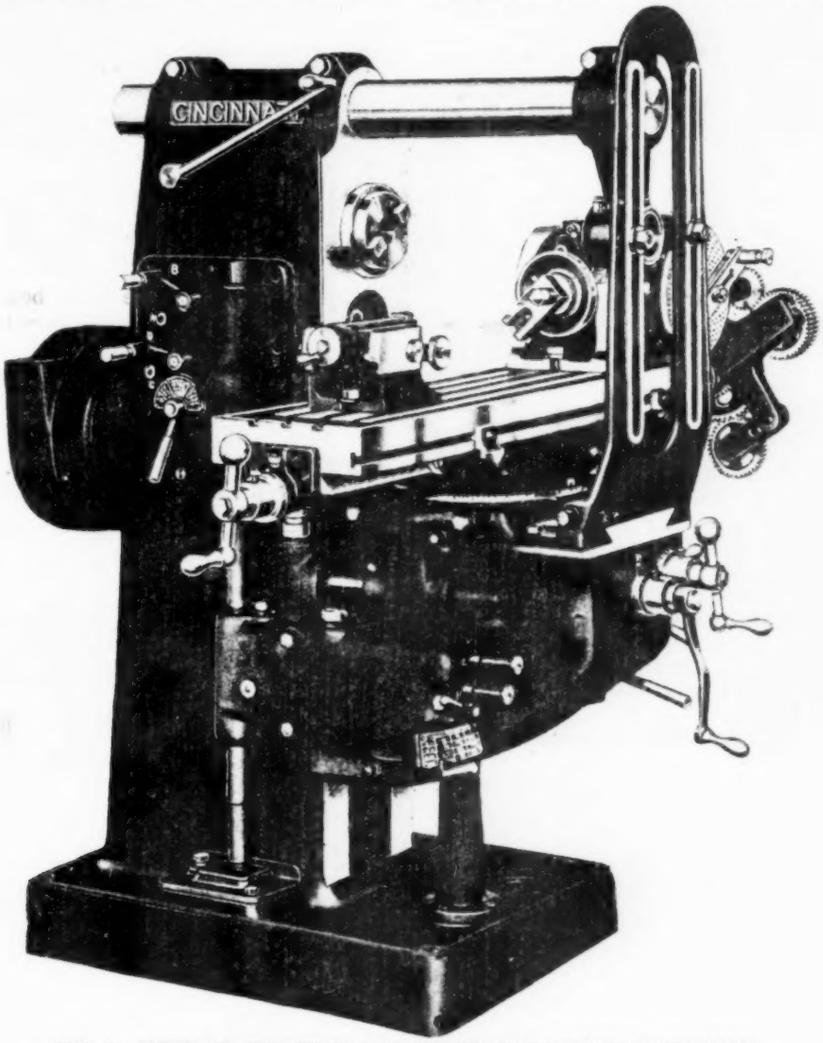


FIG. 4. VIEW OF UNIVERSAL MACHINE FROM OPERATING SIDE

The table feed trip is so arranged that after the feed has been automatically tripped, the power feed may be again engaged to feed in either direction, without first running off the dog by hand. After the feed has been automatically tripped, the feed lever can be swung away from the dog and the table feed may then be re-engaged to feed the table in either direction.

The following specifications apply in common to the Cincinnati No. 1 M-type plain, universal and vertical milling machines:

Table—Working surface 37 in. long by 10$\frac{1}{2}$ in. wide; has three $\frac{3}{4}$-in. T-slots, oil channels on sides, oil pockets on ends, and is 40$\frac{3}{4}$ in. long by 10$\frac{1}{2}$ in. wide over all. Hand quick traverse.

Driving pulley—12 in. in diameter, 1$\frac{1}{2}$-in. belt, 600 r.p.m., clutch controlled by lever from front of machine; brake automatically stops spindel when clutch is disengaged; driving belt is guarded.

Motor recommended—3 hp. constant speed, belted motor drive; any motor running not faster than 1800 r.p.m. may be used.

Spindle—3$\frac{3}{4}$ in. in diameter in front bearing, No. 14 B & S. taper hole, 1$\frac{5}{16}$-in. diameter hole through. Made of chrome nickel steel and runs in babbitted bearings adjustable for wear; Cincinnati standard flanged end.

Spindle speeds—12 in number: 20, 27, 35, 46, 61, 82, 102, 137, 183, 234, 316 and 419 r.p.m.; all changes made through sliding gears; no tumbler; all gears and shafts hardened; direct reading index plate.

Feeds—Positive; driven by gears and shafts completely protected; 12 changes in geometric progression ranging from $\frac{1}{2}$ in. to 20 in. per minute; overload releasing device for protection of feed mechanism.

Self-oiling—For all mechanism in column; centralized oiling from six stations for all other mechanism and bearings.

A simple system of automatic lubrication has been worked out in this type of machine. The upper part of the column of the milling machine forms a reservoir large enough to hold several gallons of lubricating oil. The outside of the main driving clutch is provided with fins which dip into this oil, and, running 600 r.p.m., provide ample splash lubrication, not only for the gears and shafts but also for the bearings. This same system of lubrication is followed in the vertical machine, the travel of the oil from the clutch being fully sufficient to take care of the most remote spindle bearing. In addition to this there are large cups provided for the spindle bearings on both the horizontal and vertical

machines, from which the oil is carried direct, these cups being filled by the splash system. There are also 10 oiling stations for the other mechanisms contained in the saddle, knee, and feed box.

The following apply to No. 1 plain type M:

Range—22 in. longitudinal, 8 in. cross and 19 in. vertical; all power feeds.

Full width—21 in. between face of column and braces.

Overhanging arm—3¾ in. in diameter; its under side is 6½ in. from center of spindle.

Arbor supports—There are two supports supplied, one with a bronze bush at end and one with an adjustable sleeve bearing anywhere along length of arbor.

Floor space—58½ x 84 in.; weight of belt drive, 2200 lb.

Following the usual Cincinnati practice in design, the table bearings in the saddle at the top of the V are as wide as the table itself, and as long as the maximum table travel. The knee, as may be noted from Fig. 1, embodies the features of a narrow guide and a flat bearing on which the saddle rests to the full width of the knee. The knee is supported and vertically adjusted by a single-piece vertical screw, so arranged that it is not necessary to cut a hole in the floor nor resort to the usual telescopic sleeve construction.

The following apply to No. 1 universal type M:

Table swivels—48 deg. right or left for cutting spirals.

Range—22 in. longitudinal, 8 in. cross, 18 in. vertical, all power feeds.

Dividing head—Swings 10 in., takes work 17 in. long; indexes all numbers to 60, all even numbers and those divisible by 5 to 120; index table lists all divisions obtainable to 400; plate for direct indexing low numbers on front end of spindle.

Full width—21 in. between face of column and braces.

Overhanging arm—3¾ in. in diameter; its under side is 6½ in. from center of spindle.

Arbor supports—There are two supports supplied, one with a bronze bush at end and one with an adjustable sleeve bearing anywhere along length of arbor.

Floor space—58½ in. x 84 in.; weight, for belt drive, 2500 lb.

The universal machines are identical in design with the plain, except that they are provided with a swiveling table and their equipment includes a universal indexing and dividing head, change gears for spiral cutting, universal chuck, etc. This dividing head is the standard Cincinnati 10-in. head.

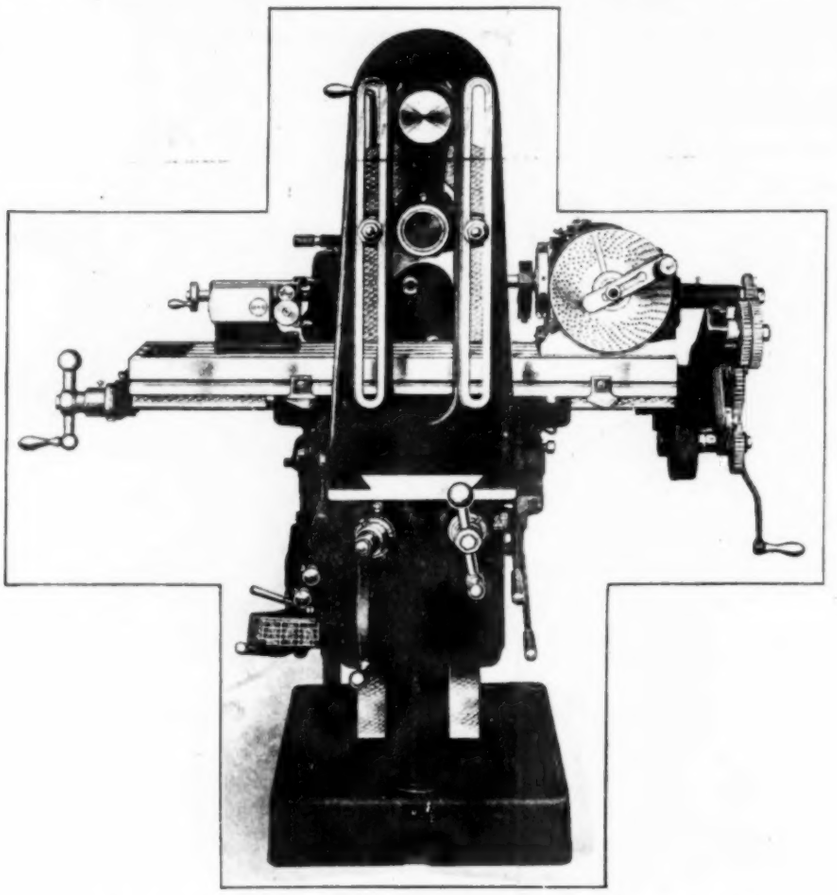


FIG. 5. FRONT VIEW, SHOWING INDEX CENTERS IN PLACE

The following apply to No. 1 vertical type M:

Range—22 in. longitudinal, 12 in. cross, 16 in. vertical, all power feeds; greatest distance between end of spindle and top of table 18 in.

Throat distance—14 in. between column and center of spindle.

Floor space—62½ in. x 84 in.; weight, for belt drive, 2300 lb.

An interesting modification of the horizontal machine is seen in the M-type vertical. These machines are of the fixed-head type with all vertical adjustments made through the knee. With the exception of the upper part of the column and its mechanism, which is shown in the phantom view in Fig. 6, they are identical with the plain M-type machines of corresponding size. It will be noticed that a pair of bevel gears are used to transmit the power from the horizontal to the vertical shafts, and that a pair of sliding gears on an intermediate shaft and operated by the swinging lever, shown at *A*, gives two series of spindle speeds.

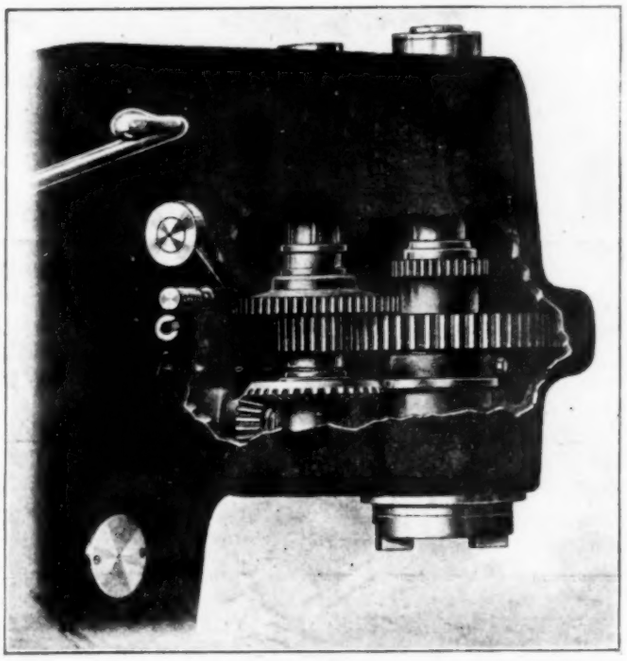


FIG. 6. PHANTOM VIEW OF VERTICAL TYPE-M SPINDLE DRIVE

The following specifications apply in common to Cincinnati No. 2 M plain, universal and vertical milling machines:

Table—Working surface 49 in. long by 10½ in. wide; has three ⅝-in. T-slots, oil channels on sides, oil pockets on ends and is 52¾ in. long by 10½ in. wide over all; hand quick traverse.

Driving pulley—12 in. diameter, 2-in. belt, 600 r.p.m., clutch controlled by lever from front of machine; brake automatically stops spindle when clutch is disengaged; driving belt is guarded.

Motor recommended—5 hp. constant speed, belted motor drive; any motor running not faster than 1800 r.p.m. may be used.

Spindle—3¾ in. diameter in front bearing, No. 14 B. & S. taper hole, 1⅞-in. diameter hole through; made of chrome nickel steel and runs in babbitted bearings adjustable for wear; Cincinnati standard flanged end.

Spindle speeds—12 in number: 20, 27, 35, 46, 61, 82, 102, 137, 183, 234, 316 and 419 r.p.m.; all changes made through sliding gears; no tumblers; all gears and shafts hardened; direct reading indexing plate.

Feeds—Positive; driven by gears and shafts completely protected; 12 changes in geometric progression ranging from ½ in. to 20 in. per minute; all changes made through sliding gears from front of machine; no tumbler; all gears and shafts hardened; overload releasing device for protection of feed mechanism.

Self-oiling—For all mechanism in column; centralized oiling from six stations for all other mechanism and bearings.

The following apply to No. 2 plain, type M:

Range—28 in. longitudinal, 10 in. cross and 19 in. vertical; all power feeds.

Full width—25 in. between face of column and braces.

Overhanging arm—3¾ in. in diameter; its under side is 6½ in. from center of spindle.

Arbor supports—There are two supports supplied, one with a bronze bush at end and one with an adjustable sleeve bearing anywhere along length of arbor.

Floor space—62½ in. x 102 in.; weight, for belt drive, 2500 lb.

The following apply to No. 2 universal, type M:

Table swivels—48 deg. right or left for cutting spirals.

Range—28 deg. longitudinal, 10 in. cross, 18 in. vertical, all power feeds.

Dividing head—Swings 10 in., takes work 29 in. long; indexes all numbers to 60, all even numbers and those divisible by 5 to 120; index table lists all divisions obtainable to 400; plate for direct indexing low numbers on front end of spindle.

Full width—25 in. between face of column and braces.

Overhanging arm—3¾ in. in diameter; its under side is 6½ in. from center of spindle.

Arbor supports—There are two supports supplied, one with a bronze bush at end and one with an adjustable sleeve bearing anywhere along length of arbor.

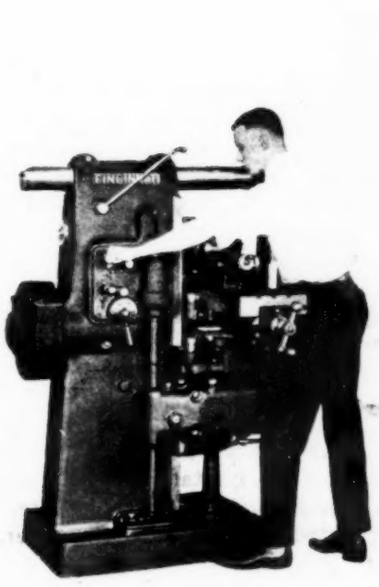
Floor space—62½ in. x 102 in.; weight, for belt drive, 2800 lb.

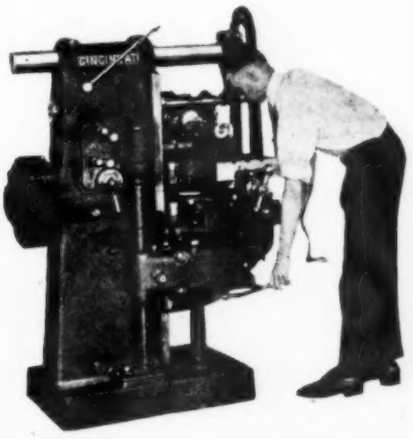
The following apply to No. 2 vertrical, type M:

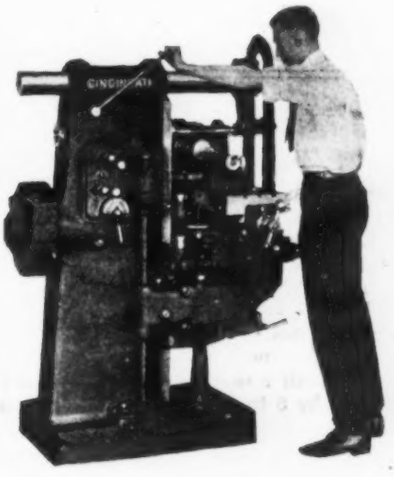
Range—28 in. longitudinal, 12 in. cross, 16 in. vertical, all power feeds; greatest distance between end of spindle and top of table 18 in.

Throat distance—14 in. between column and center of spindle.

Floor space—62½ in. x 102 in.; weight, for belt drive, 2600 lb.







Missionary Machinery: An Appeal

A glance at the "elaborate" machine-tool equipment of a typical Chinese trade school as shown in the illustrations published with this letter from an American mechanical engineer in China should convince the most skeptical of the urgency of the writer's appeal. Perhaps no immediate orders would result from the dispatch of machine-tool missionaries to China, but then not all advertising does give immediate results.

April 15, 1919.

DEAR SIR:

The editorial in the *American Machinist* of Jan. 23, which arrived here a few weeks ago, on the "Solution of the War-Tool Problem," strikes me as a good suggestion and, at the same time, starts another suggestion, which from this distant point of view seems important and worthy of consideration.

In the general reconstruction of the world's affairs going on at the present time, the position of China calls for considerable broad thought and attention. A nation which has such vast undeveloped resources of men and materials becomes a serious responsibility to the other and more advanced nations unless the resources are developed properly and legitimately. The relation of China to the rest of the world is somewhat analogous to that of Mexico to the United States, or to that of Cuba a few years ago. There is this difference in favor of China; it is a vaster country, and in about the same degree, a great problem, although there is much better material to deal with from the human side of the problem.

It is very necessary to extend a helping hand to this struggling country in order to place her on a self-supporting basis, and to give her a solid economic foundation on which to build her new republic. Otherwise she will always be a menace and a stumbling block in the path of peace of the other nations.

There are, as has often been stated before, great material resources which need to be developed in order to give her the necessary wherewithal to trade on fair terms with the rest of the world and to strengthen her economically. One of the greatest needs of the present is railways. Transportation facilities are terribly inadequate for the needs of the country. There are numerous good waterways, fairly well developed, but they do not reach anywhere near all the vast productive regions. Public highways, as we know them in America, are almost unknown here. On account of this condition there are vast productive regions (potentially productive) undeveloped except for local use, which would become profitable producing communities, fully populated, if the products of the regions could be transported at reasonable rates.

The mining field, the agricultural richness of the country and many other fields are just waiting for the opportunity. Behind all these activities must stand the necessary machinery, and behind all must stand the machine shop.

The importance of the skilled mechanic, his tools and machinery, is being realized in many localities in China, and preparations are being made, in a more or less tentative way, to meet this compelling need. Schools of a sort are started but they simply do not know the real state of development or possibilities of machinery in other countries, and do not realize to what a high standard they must strive. Some of their efforts are pitifully futile just because of their lack of knowledge of the possibilities, or one might almost say, the absolute necessities of the situation. *They just do not know and must be shown.* They are quick to see and appreciate good things in the mechanical line when given the opportunity to see them demonstrated.

One of the best ways of showing them is to install a number of good American machine shops in some of the more progressive and ambitious technical and industrial schools here. The students would undoubtedly do great propaganda work for the machines so given and for the makers of such machines as they had become familiar with. This would be making a strong and favorable impression on the younger generation and at the impressionable age.

There are quite a number of schools which are turning out teachers for manual training, etc., and each of these schools, if they were equipped with American tools, would become centers of dissemination of new ideas of the possibilities of such machines. Each graduate as he went out to take up this work among the new schools being established would start a new center for the same kind of propaganda.

In the school with which I am connected there is a class of 35 young men who will be graduated as teachers next winter. They will not have had very much experience with machine work because I have only recently succeeded in persuading the college authorities to install a machine equipment. Last fall a new class of 119 men who had had from one to three years of teaching experience, was started here as a successor to the above-mentioned class. These men were selected by competitive examination, one from each Hsien city (county seat), in this province (Chihli) which contains a population about equal to one-fifth of that of the United States. There are 17 other provinces. Thus you can see what a radiating power such a center has.

There are two other schools here in Paotingfu which are interested in manual training and are better equipped than this school, but under Chinese management. Their equipment is pitifully inadequate from an American point of view, but it represents the scope of their present knowledge and vision. In Peking there are one or two larger schools undertaking industrial work and attempting to turn out teachers to prepare the fields for larger work. Their facilities are about on a par with those to be found here in Paotingfu. The same may be said of several other large cities where foreign influence has made itself felt. They all need to be shown. You cannot show them by pictures nor by talk; it takes the actual demonstrations on the machines to really carry any weight.

The equipment for this school, recently obtained, was made in Peking by Chinese and consists of two small engine lathes, a small upright drilling machine and a 24 x 24 x 48-in. planing machine. These are driven by hand-power drives, as shown in Fig. 1. The workmanship and design of the machines is abominable and as we come to use them they show up defects that would relegate them to the scrapheap in America. They represent about the only available machines obtainable

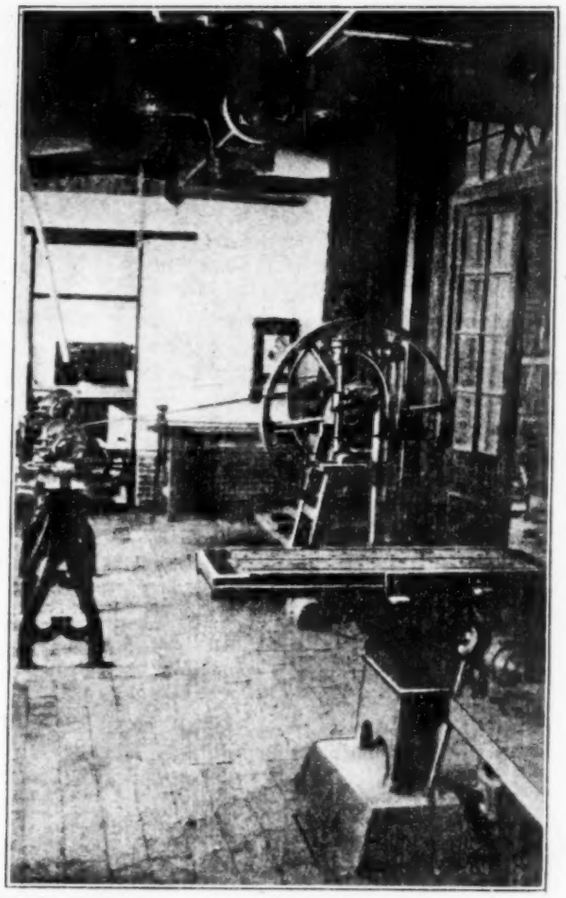


FIG. 1. THE MACHINE SHOP AT THE CHIHLI HIGHER NORMAL COLLEGE PAOTINGFU, CHINA

at the time, unless one paid two or three times as much and waited many months. The students take to the work with these machines with great enthusiasm. They seem to open up new vistas of possibility to them. What would be their enthusiasm if they had some good American machines at the side of these old things to see the contrast?

Do you think that any of the surplus machinery mentioned in your article could be sent here to one or two approved schools where they would be good advertisements for American tools?

Last December I wrote to Charles Hildreth of the National Machine Tool Builders' Association about the conditions here and the opportunity of getting into the market here by donations to the schools. He had the letter mimeographed and sent to the members of the Association. Several of them wrote me immediately on receipt of his letter, asking for further information or offering machinery at half price, showing an appreciation of the idea.

Many of the really deserving schools here which could use a good outfit to advantage could not afford to buy very much at the present state of the school system. It looks to me that much the better plan, at first, would be to give some outfits and thus create a want for more. Remember, they must be shown before they can really understand the great difference between Japanese and Chinese machines copied from ancient European models and made indifferently with very poor materials. They must really see the machines side by side in order to realize the great difference and where the difference in price comes in. With the Oriental machine right at hand they cannot see why they should pay more for a machine whose standard they have never yet realized. Mere telling will not convince them, nor will pictures convince.

A short time ago Marshall J. Root, president of the Seneca Falls Manufacturing Co., Inc., was in Peking and I met him there by appointment. We talked over the situation and the needs of the country. The result of the interview was that he agreed to give me, outright, a good toolroom lathe with standard equipment, with the understanding that I would see the freight paid and pay for any special fittings that go with the lathe if wanted. It was also agreed that I should place the lathe where it would do the most good for the makers and for the Chinese, and that in event of any change of conditions by which the usefulness of the lathe was impaired by non-use or poor care, I should be at liberty to transfer it to another school.

You may perhaps have known of the gift of Pratt & Whitney of a fine toolroom lathe of latest design and with all fittings, to the Tangshan Engineering College, in 1914, just before the outbreak of the European war. At that time I had an intimation from a member of the *American Machinist* staff that there were other machines to be sent by various firms, but the war put a stop to that matter. The present agitation is a renewal of the efforts of the pre-war time. It seems a most appropriate time to resume these efforts to get American machinery here.

The greatest need would be for lathes of medium or small size, a small planing machine, milling machine, drills and the usual small tools which go with them like milling cutters, lathe tools, taps and dies, and drills.

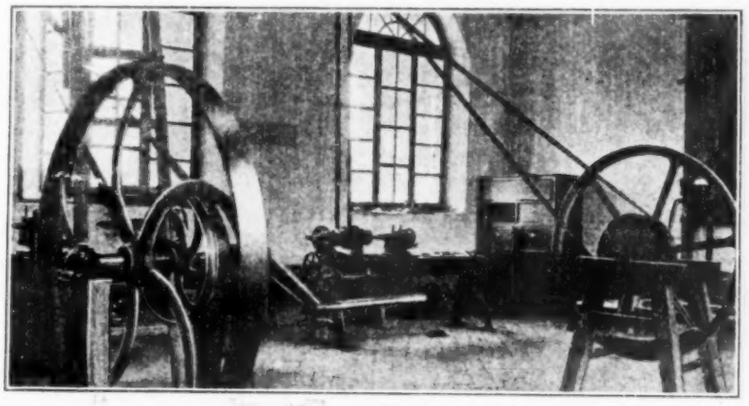


FIG. 2. HAND-POWER DRIVES FOR THE MACHINE TOOLS AT THE YÜ TE SCHOOL

A lathe with relieving attachment for making taps, dies and reamers would find good use. Milling cutters for making gears would be very useful, as there are very few cut gears available here. Grinding machinery and an oil engine would be very useful and acceptable.

Immediate action is necessary as the economic development must not be kept waiting for a new generation of trained men to grow up. The men must be ready as fast as the need arises. That is going to be a hard thing to provide with the present conditions of instruction or the machines of Oriental origin. I sincerely hope that something can be done to show these people what is what in the machine-tool line. It will have to be made easy for the people here to make the start.

Several of us foreign teachers of industrial work, etc., are trying to inaugurate a practical and comprehensive system of instruction in manual arts that will become universal throughout the country. There is a growing demand for such instruction and now is the opportunity that will never return.

The Yü Tê Middle School, here in Paotingfu, is a private school that has recently established a manual-arts department, Fig. 2, with great success. It was approached by the French, through whose efforts a class has been trained and sent to France to earn their way through French industrial and technical schools. There is enterprise for you! They took a year's course in the French language at the same time they were taking their manual training course here. I wish they had been going to America. They would have liked to go there, too, but there did not seem to be much encouragement for getting an education that way in America, the land of the free. The French have made a good bid for favor by their friendly overtures. Why not the Americans? There is a very gratifying feeling of friendliness toward Americans, their ideas, methods and products. It is the ambition of many of the young men to get to America for the finishing touches to their education. Our school has sent several there, but along other than industrial lines.

If you think you could do anything toward starting some machinery along in this direction I should be very glad to do what I can to see it well placed where it will give the best advertising to the givers. Machinery installed here could be made a sort of exhibition for those who are looking for such machines. If you can give me any suggestions as to securing such gifts I shall be very glad to receive such advice. Yours sincerely,

FRANK A. FOSTER,

Chihli Higher Normal College, Paotingfu, China.

Rules of Etiquette To Be Observed in the Machine Shop

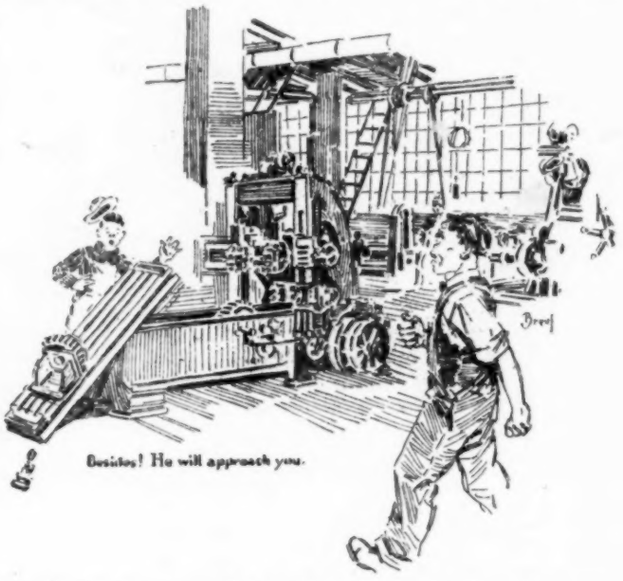
BY JACK HOMEWOOD

When applying for a position: Tell the foreman that you are an exceptionally first-class worker; that you hold the record for speed; that you were awarded a gold medal for neatness and precision; that you are pestered almost to death by other firms seeking your services. Don't tell him the truth; you may hurt his feelings. He likes to be fooled, and enjoys hiring new men with the prospect of firing them tomorrow.

When you bore a hole too deep or turn a piece up too far: Approach the boss. Stand erect, holding offending piece of work in the left hand (you will need the other hand in explaining how it happened). Tell him that as you reached for the scale the carriage ran away; anything will do. Don't tell him that you were out to a dance the night before, and that you fell asleep. He may consider you careless, like the chap who fell asleep while boring a job and was rudely awakened by the heavy chuck dropping in the chip box.

When you run the platen off the planing machine: This may cause you a slight chill. (A little Christian Science sometimes overcomes that; you may convince yourself that it isn't off.) Look around the shop in an unconscious manner to see if anybody is looking at you. It isn't necessary to approach the boss, as the platen is too heavy to hold in your left hand—and, besides, he will approach you. Explain to him that the other fellow left the trip dog loose; that this is the first planing machine you ever saw start up itself. Don't under any consideration tell him that you forgot to tighten up the dog before starting up the machine; he may not believe you.

When you find that you have half a tooth extra in the gear that you are cutting: Turn the handle of the index head twenty times, as fast as you can. This will hide the



bum tooth from possible prying eyes. As though unconcerned, get your screwdriver from the bench; while over there put on an extra coat of camouflage by leaning over to the next fellow and telling him that you can't seem to make the spacing bar on the dividing head stay tight. Proceed to the machine and tighten up the screw so that the thread strips; then move spacer slightly.

Becken to the boss, and as he approaches wind the crank twenty times, bringing the surplus tooth to the top. Indicating the tooth, with your thumb over your left shoulder, repeat these words: "Boss, I'm sorry this has occurred; it is the first mistake I have ever made on the dividing head." (Pay no attention to the little voice within you that says "Liar.") Boss will naturally examine your layout and in doing so will discover that your spacer is incorrect. Now here is your point (don't get excited); as you shove him gently aside, say: "I'm sure I set that right; I checked it twice." Then you attempt to reset it, and it moves; you find the stripped thread and call his attention to it. If the boss is of the right sort he will express his sympathy by sending you a bouquet with his compliments.

Don't tell him that you had your mind on your new Ford car while you were winding the crank in dividing.

Making and Using DRIFTS

By H.F. Pusep

The making of various shaped holes in metal presents few difficulties to a well-equipped shop or toolroom; yet the small jobbing shop, the solving of this problem requires no small amount of ingenuity. Properly made drifts will greatly facilitate matters, and it is the purpose of this article to review the possibilities of this tool.

THE finishing of small holes, of other than circular form, in metal, by the aiding of a hardened-steel drift as a sizing medium, is one of the oldest arts known to the metal-working industry. It is practiced to some extent by the old timers and a very few of the up-to-the-minute mechanics, but its mysteries are almost a closed book to the majority of younger mechanics. The broaching machine has replaced the drift in the production field, whereas in the toolroom it still has its place as the only reliable method of finishing holes to any required degree of accuracy. In short, a drift is a tool for forming a hole by being driven through the partly worked out opening with a hammer. Machanics inexperienced in the art of drifting, are often ready to condemn this method too readily, when the fault lies not in the practicability of drifting a given hole but in the wrong construction of the drift.

A Square-Hole Drift

Probably one of the most common uses to which a drift is put, is illustrated in Fig. 1. The boring bar *A* has a square hole *B* through the bar at right angles to its axis. For finishing this hole the drift *C* is used. It is usually made of square drill rod of the same cross-section as the diameter of the hole to be drifted. For making the drift, the pilot *D* must be tangent to all four flats on the drift.

If anything like accurate results are expected, this pilot hole must be in exact location to that of the square hole, for which it serves as a pilot. It also must be bored or reamed to the same diameter as the distance across the flats of the square hole. The relation of the pilot hole to the completed square hole is indicated by dotted lines *E* in Fig. 1.

If drill rod of the right dimension is not available, any good tool steel is suitable for the purpose. In machining a drift, two methods can be employed. One is to finish-turn the pilot *D*, allowing a slight clearance between the pilot and finished hole, and then fasten the rough blank in a machine vise, setting it in line with the finished pilot, and shape or mill the flats till they come tangent to the pilot. The other method is to finish the flats in the body of the drift first, and then chuck it in the lathe and finish-turn the pilot. Where square drill rod of the right size is used, the latter method, of course, must be resorted to; otherwise the former method of machining the pilot first is recommended.

Novices at the art of drifting often make the mistake of recessing the pilot at the point where it joins the body of the drift. The right way is shown at *A*, Fig. 2, where it will be seen that the pilot is perfectly parallel and joins the cutting end of the drift in a sharp corner at *B*. A fillet of any kind at this point is detrimental to the performance of the drift. No satisfactory reason can be given why so many beginners persist in recessing the pilot of a drift at *C*, the nearest one being the explanation that it will serve as a chip room. It certainly serves as a "chip room," but not in the way it was intended. This recess jams full of chips and in withdrawing the drift, the pilot is often broken off.

Drifting a Square Hole

For the square-hole drift just described, it is desirable to rough-machine the body, then grind the flats to finish size after hardening. With a drift made in this way very accurate work can be produced. The pilot is always, without exception, finish-turned before hardening, as it would be very difficult to grind a perfectly sharp corner. With a properly made drift, there is only a theoretical point *D*, where the edges of a drift do not cut. This is at the point of tangency between the perimeter of the pilot and the center of the flat on the drift.

The driving end of the drift must be kept well beveled to prevent it from spreading. The drift should be hardened to suit the stock to be drifted.

The square hole to be drifted, *B*, Fig. 1, is laid out and the pilot hole is drilled, or bored and reamed, according to accuracy desired in the finished product. Most of the stock in the corners is now removed to within $\frac{1}{64}$ in. of the layout lines on both ends of the hole by chipping where the hole is shallow, or by chipping and filing where the hole is deeper. A slotting machine, if available, will facilitate the roughing-out operations, although it is almost impossible to slot deep holes of small size on account of the springing of the slotting tool. The pilot of the drift is inserted into the remaining portions of the original pilot hole and the cutting edges of the drift are lined up to the layout lines on the bar which is held on V-blocks. Without disturbing the position of the drift, it is given a sharp blow with a hammer, thus leaving a distinct outline of the entire hole or sections of it, depending upon the location of the hole. The drift is now removed and the stock, sheared off the sides and corners of the hole, is filed off. These operations are repeated until the drift is driven clear through the bar. A drift should not be forced with a heavy hammer, as it will not expedite the job to any extent, and a drift so used leaves a rough hole, causing the metal in the hole to "freeze" to the drift. This is a frequent cause of drift breaking. Instead, use a light-weight hammer and stop driving when the drift shows signs of sticking. Good lard oil used on the cutting end will help the drift produce a smooth finished hole. All square holes should be drifted from one end only. The reason for this is easily explained. When holes are drifted from both ends alternately, there is a possibility of the drift being a few thousandths of an inch out of line in starting, which would leave a ridge where the holes meet.

Blind holes are drifted the same as through holes. For such holes, however, it is best to make two drifts, one with a short pilot for starting the hole and the other without a pilot for completing the hole. A drift for a blind hole is driven very lightly on account of difficulty experienced in removal, should the drift be jammed tightly into the hole. The stock that is sheared off, is in this case removed entirely by chiselling, leaving the final finishing of the hole for the file.

Drifting Long Rectangular Holes

In working out holes whose cross-section is in the form of a rectangle, the operation should always be planned so that the slotting and drilling machines do most of the work. Fig. 3 shows the different methods of working out rectangular holes, the length of the hole being the determining factor in each case as to which method to use. At *A* is shown a hole that is long enough to accommodate two full holes *B*. These holes are of such size and bored in such a manner that they come tangent to the ends and the two long sides of the rectangular hole. The remaining bridge of metal at *C* is then removed with an end mill, fish-tail cutter or the slotting tool.

Fig. 4 shows an efficient tool for roughing out the metal between the pilot holes in any deep rectangular hole. As can be seen, it is a modification of a fish-tail cutter and is made of drill rod of diameter *A* slightly larger than the hole to be worked out. The end for the cutting lips is squared and diameter *B* is turned about 0.005 in. less than the width of the hole *D*. Starting $\frac{1}{16}$ in. from the squared end the body from *C* to *D* is turned down slightly smaller for clearance. The four flutes *E* and the $\frac{1}{16}$-in. land are formed and backed off. The dimension *F* should be equal to one-half the depth of the hole plus $\frac{1}{8}$ in. After hardening and honing the cutting edges, the cutter is ready for use.

The cutter just described has several advantages over any other for this particular class of work. It will not run off or pull into the sides of the hole when fed into the work, and will leave a smooth parallel hole. High speed and fine feed should be used, and the cutting end of the tool should be well lubricated with cutting compound.

Referring to *E*, Fig. 3, is shown a method of drifting rectangular holes where the pilot holes overlap. In this case it is good practice to drill one hole *F* to correct size and plug it with a piece of cold-rolled steel *G*, which should be a light drive fit in the hole. This plug should be anchored with prick punch marks *H* to prevent the plug from turning while drilling the second hole. These small prick punch marks, while keeping the plug in place, will not prevent it being driven out after the completion of the second hole.

Still another method of machining the pilot holes, where they overlap, is shown at *I*, Fig. 3. The hole *J* and a small hole *K* at center location of the second hole *L* is drilled. A counterbore whose diameter is *L* using a pilot to fit can now be used. This method is considerably slower than the one of plugging the first hole, but where a counterbore of the right size is available, and the hole is not very deep, it will produce satisfactory results. There are occasions where neither the counterbore nor the plug method can be used, such a rectangular hole is shown at *M*, Fig. 3. As the dimension *N* is only slightly longer than *O*, it will accommodate one full pilot hole *P*, the remainder of stock at *R* is then removed with the end cutter, as described in Fig. 4.

Two types of drifts for rectangular holes are shown in Fig. 5. The one at *A* is for drifting rectangular holes like *A*, Fig. 3, and has two pilots. This construction is very desirable where the pilots are far enough apart to allow sufficient room for the turning tool. The centers of the pilots are located and a saw cut is made at *B*. The drift blank is centered in a lathe chuck and formed by use of the simple hollow mill *C*. This is made of drill rod and is held in the tailstock drill chuck of the lathe and fed to the desired depth. The stock not reached by the hollow mill is filed off and the body of drift machined to size, leaving stock for grinding the flats after hardening if desired. It is best to make the hollow mill a little over size so that the pilots can be finished-turned to correct size with a narrow turning tool.

The sketch at *D* shows a rectangular hole drift with one pilot suitable for holes like *E*, *I* and *M*, Fig. 4, but can be used for all other forms of rectangular holes as well. The single-pilot drift is much easier to make and is therefore frequently used in place of the two-pilot drift. In order to guide the drift properly, all single-pilot drifts, for rectangular holes, should have the length of the pilot about three times the diameter of the pilot hole in the work. The method of using a rectangular-hole drift, whether with one or two pilots, is identical in every way to square-hole drift, as already explained.

Fig. 6 shows a die blank for a compound die that is

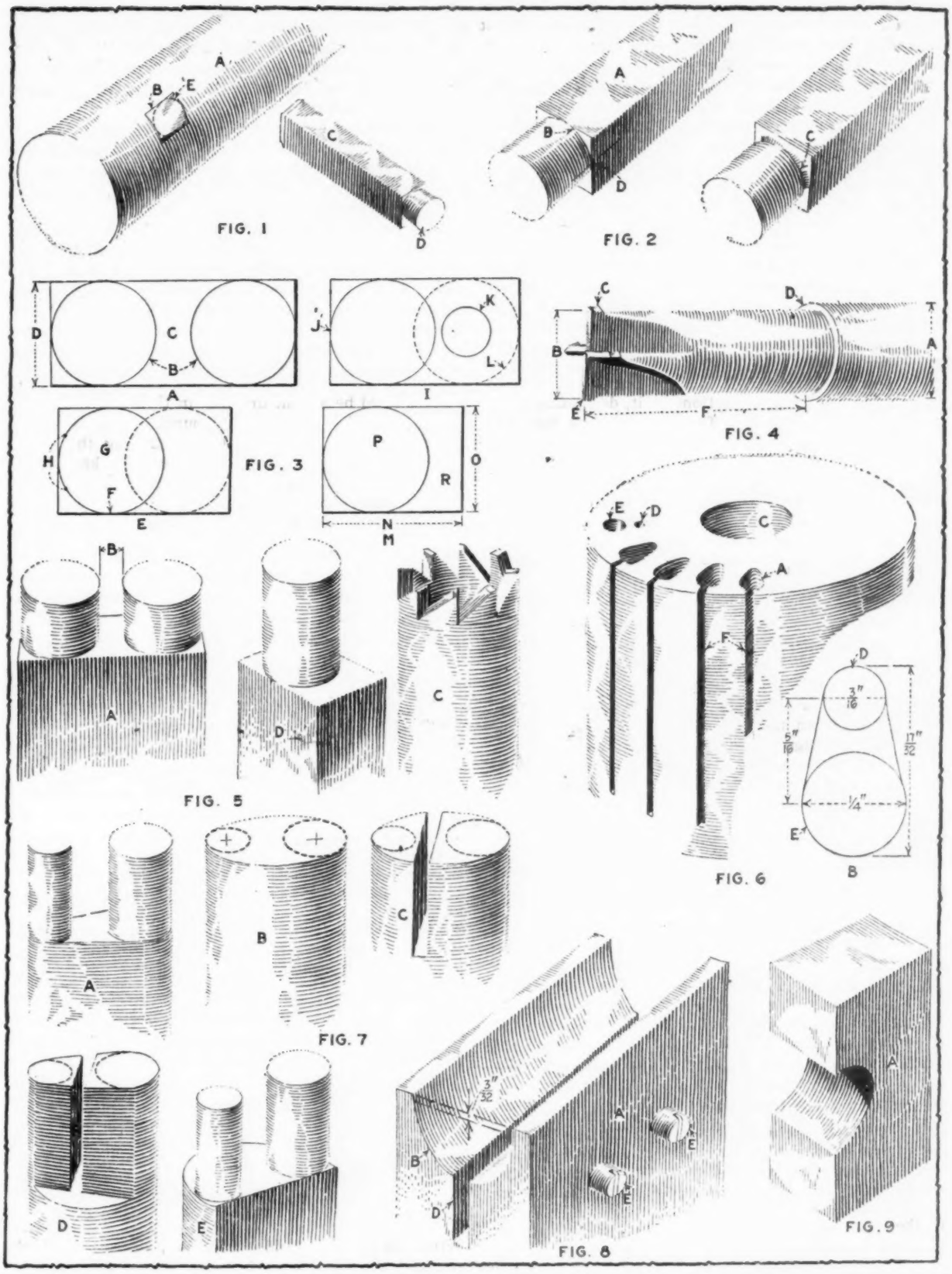


FIG. 1. DRIFT FOR MAKING SQUARE HOLE IN A BAR
FIG. 2. THE RIGHT AND WRONG WAY TO MAKE A DRIFT PILOT
FIG. 3. ROUGHING OUT LAYOUTS FOR RECTANGULAR HOLES
FIG. 4. ROUGHING OUT CUTTER
FIG. 5. ONE- AND TWO-PILOT DRIFTS AND A TYPICAL HOLLOW MILL FOR ROUGHING OUT THE PILOTS
FIG. 6. A LAMINATION DIE
FIG. 7. DRIFTS FOR FINISHING A LAMINATION DIE
FIG. 8. A MILLING FIXTURE FOR MAKING THE DRIFT SHOWN IN FIG. 7
FIG. 9. PILOT TEMPLATE

used for blanking out electric-motor laminations. These dies are made of a solid piece of oil hardening non-shrinkable tool steel and are extra thick for their diameter, the die shown being 2¾ in. in diameter by 3 in. thick. The use of oil hardening non-shrinkable tool steel is recommended for dies and drifts because they can be finished to size and if hardened with care any change that takes place will be negligible. As the number of these laminations required often runs into millions, provision is made in the thickness of the die for re-sharpening the cutting edges by grinding. There are in the die blank shown 18 equally spaced openings. A dimensional sketch of the openings *A* is also shown at *B*, Fig. 6. The dimensions of these openings are held to close limits as to size and parallelism along their entire depth and on account of their comparatively small size the machining of them is quite a problem in diemaking. In many shops a man is considered to be a real diemaker if he can make a first-class lamination die.

The drift method is the only accurate way of finishing all these openings alike. After the die blank, Fig 6, has been machined up and the central hole *C* bored

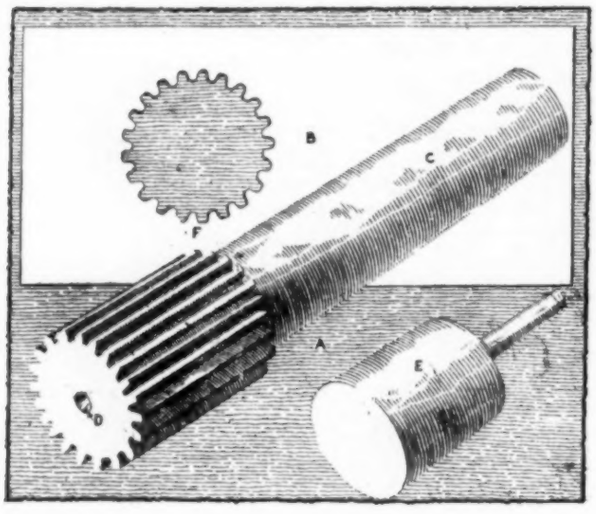


FIG. 10. DRIFT FOR MAKING SMALL GEAR-BLANKING DIE

it is clamped to the faceplate of a dividing head and the center hole trued up. Two rows of holes for the ends of the openings *D* and *E* are drilled, and the bridge of metal between the two holes in each opening is removed by filing or with a slotting tool. The drift for this die is shown at *A*, Fig. 7. As the making of this drift to the necessary degree of accuracy calls for skill and ingenuity of no mean order, a detailed description of the process is here given.

The drift for the lamination die has two pilots, this is necessary in order to line up the cutting edges of the drift with the radii of the die openings. The various stages of machining the drift which are similar to those used for two pilot drifts are shown at *B*, *C*, *D* and *E* in Fig. 7. However, in milling the flats of the drift, it is important that they are tangent to the pilots and be parallel to their axes for the entire length of the drift. This is accomplished with the simple fixture shown in Fig. 8, which consists of a piece of cold-rolled steel *A* of suitable length, with a semicircular groove *B*, which is a sliding fit for the cylindrical drift blank. The edges *C* are within $\frac{1}{32}$ in. of center of the groove and a saw slot is milled at *D*. This fixture is held in a vise, the cylindrical drift blank being clamped in position by the screws *E* and milled complete. The pilots are trued up and checked by means of simple templets, shown in Fig. 9.

The working out of the lamination die, shown in Fig. 7, with the drift just completed, is used in the same manner as described elsewhere and will now be a pleasure instead of a drudgery. The slots *F* are milled after the openings *A* have been drifted.

Dies for blanking small gear wheels, such as used in clock and watch factories and various other industries, can be easily made by means of a drift. The punch *A*, Fig. 10, which is also used as a drift for sizing the blanking die *B*, is machined accurately to size. The shank *C* is left oversize to allow for grinding, after hardening, for a good fit in the punch holder. The pilot shank hole *D* is for the purpose of accommodating a temporary one *E* for drifting, and a permanent working pilot such as used in all progressive piercing and blanking tools. A hole is bored in the die blank *B* of diameter *F*, equal to the root diameter of the gear, and after roughing out the tooth spaces to near their finish form, the drift *A* is worked into the die. If too much force is used in this operation, rough or torn teeth in the die will be the result. Taking a mere shaving cut with this drift and using good lard oil as lubricant will invariably produce a mirror-like finish in the die. The pilot *E* is used while shearing the die, its diameter being a slip fit at *F*. If the face of the die is covered with a thin coating of solder, and the drift, guided by pilot, is brought into contact with this surface, a slight blow on the shank of the drift will leave a very clear, sharp outline of the gear blank as a guide for the roughing out operation.

It can be seen from the foregoing that the drift has a field of usefulness in the machine shop and toolroom that under certain circumstances cannot be successfully supplanted by any machine or method.

Protecting Plug Gages

BY W. C. WINKELMAN

Considerable trouble was caused by inspectors dropping plug gages on cement floors which often turned up or raised burrs on the edges of the gages, thus making it necessary to send them to the toolroom for repairs. To overcome this trouble the writer designed the gage shown herewith, which remedied the trouble.

A PLUG GAGE

The maximum gage *A* which is next to the handle *B* is followed by the minimum gage *C*, with a projection *D*, turned on its end. This projection furnishes ample protection for the edge of the gage.

Specific Depreciation as Applied to Mechanical Deterioration

By W. W. POLLOCK

What is the present physical value of your plant? Do you merely guess at the depreciation factor or do you determine this percentage by a scientific analysis? Modern business methods and competition demand careful inventories and the recording of the resulting data. This is, in itself, an excellent form of insurance.

PERHAPS the practice of attempting to measure by annual rules the lessening usefulness of inanimate objects, such as buildings, machinery, tools and other useful equipment of industrial properties, originally developed from the personal experiences of the human race, the members of which usually decline in their strength of body and mind with increasing age and finall become a total loss.

All things pass away and become useless, but there are fundamental differences in the nature and causes of depreciation in men and women and in buildings and machinery. The probabilities of human life have been computed by the life insurance companies, and life insurance rates are fixed so that the insurance companies can remain solvent; and the age rates of depreciation of buildings and machinery have been worked out so that the anticipated lessening of usefulness will be more than covered.

As a matter of fact, manufacturers will always be obliged to estimate future depreciation, and for cost-accounting purposes, include the anticipative depreciation estimates, in yearly or monthly rates. But the time has arrived when, with a constant demand for greater accuracy in plant accounting, it has become necessary to confess that the old methods require revision and rechecking, and that the whole question of depreciation should be studied on its merits.

Every intelligent manufacturer will at once agree with the proposition that age is not the true measure of depreciation and that no one, who is given merely the length of time a plant has been in operation, can possibly exercise an accurate judgment as to its deterioration. Even though one with experience in a given industry may have a perfect knowledge of general conditions in that industry, his guess, based on mere length of service without definite knowledge of all the conditions of use, would be of little worth.

While age-rate estimates may be speculatively continued for future depreciation, the exercise of judgment as to the depreciating effect of past use must, in order to be accurate at any given time, be measured so as to describe and summarize the effect upon valuation of the things that have really happened.

Depreciation Defined

In the first place, depreciation is a matter of judgment only. The intelligent exercise of depreciation judgment must be based upon a knowledge of the characteristics of the thing to be depreciated, its capabilities, its limitations, the character of the service it has been called upon to perform, and the progress of invention in the particular art. This must be supplemented by an inspection to determine the wear and tear and the weakening or breakage. After a careful balancing of these specific elements the appraiser is only hampered by the attempt to inject into his judgment the application of rules, devised in the attempt to measure the effect of conditions which may have been vastly different in other plants.

If depreciation may be intelligently expressed only through the exercise of opinion or judgment, then it is true that rules for depreciation which ignore the effect of inspection, the special knowledge of the appraiser concerning the capabilities and limitations of the thing, the actual usage to which it has been subjected and the general conditions affecting that particular art, can only confuse the proper exercise of judgment. If such rules have the semblance of reliability, then the exercise of judgment as to depreciation is unnecessary and superflous. If they are not reliable and subje to many exceptions in their application, then why not throw them aside altogether and depend solely upon judgment?

To ignore age rates and depend alone upon judgment does not mean that the judgment is to be haphazard. All opinion that is worth while is based upon knowledge and experience. But age rates based upon the experience of another person, at another plant, under other conditions, do not constitute a criterion for the appraiser who undertakes to appraise a given condition. There are many persons whose intuitions are valuable—who can express a valuable opinion without being able to say just why they hold such an opinion. Also, there are many able persons who

Detailed List of Property and judgment of depreciation thereon. The New Reproductive Cost should be revised each year, and specific depreciation for each class of depreciation (if any) should be expressed each year.

CLASSIFICATION OF PLANT	New Reproductive Cost including Freight and Installation	Estimated Scrap Value	Depreciable Value	DEPRECIATION					Remaining Depreciable Value	Present Value (including Scrap Value)
				Mechanical Deterioration %	Obsolescence %	Lack of Utility %	Total Depreciation %	Total Amount of Depreciation		
16 in. LATHE	1000.00	100.00	900.00	20	5	0	25	225.00	675.00	775.00

FIG. 1. A TYPICAL FORM FOR RECORDING DEPRECIATION FACTORS

possess knowledge, but lack the gift of expression. The best judgment is that which is the result of accurate analysis and in expressing depreciation judgment, there should be clearly defined rules for its analysis and measurement. A little thought will indicate the distinction between hard and fast rules for depreciation, and rules for analysis of opinion of depreciation.

A lathe is a combination of materials which in themselves have a market price, even though the machine may have become useless. The market price of scrap metals may fluctuate, but at the time of the appraisal it is possible to closely estimate the scrap value of the materials in a machine, after it has lost its machine value. This scrap value, in an appraisal which is scientific, is not properly subject to depreciation, because it is always a contingent remainder which be realized upon. It is conceivable that the conservative manufacturer might think it advisable as an accounting policy to wipe the scrap value off his books or place it in a depreciation reserve; but in consideration of the specific accrued depreciation upon a machine, the scrap value should be deducted from the new reproductive cost, and the difference, the "depreciable value," is the amount to which depreciation-judgment should be applied

Three Classes of Depreciation

There are three general classes of depreciation for which judgment may be expressed specifically, and altogether without reference to age or annual rates. These three classes, when accurately judged, cover every element of depreciation and when the depreciation has been deducted from the depreciable value, the remainder is the "remaining depreciable value." Future specific depreciation, when it has accrued, should be applied in the same manner to this amount. To show the present valuation of the machine to a going concern, the scrap value should be added to the remaining depreciable value.

This plan of applying depreciation judgment may be applied to buildings although the scrap value of most factory buildings is so far negligible that the elimination of that feature is unimportant. Whatever it is, however, may be carefully estimated and depreciation of the several classes specifically judged. Most machines have a scrap value, as well as any other metal equipment which may be utilized again in the production of other machines or tools. The usual practice is to specifically depreciate each building and each machine, and for minor classifications depreciate each classification in lump. It is possible also, by this method of analysis, to accurately apply judgement of depreciation of a plant as a whole without separately judging each item.

What, then are these three classes of depreciation which may be satisfactorily applied by way of analysis of depreciation judgment, in the place of annual rates?

After eliminating scrap value and considering the "depreciable value" remainder, the mind can readily function when asked to consider the first class of depreciation, which is known as "mechanical deterioration," that is, wear and tear or breakage. It is easy to say that the machine or other object has not deteriorated mechanically, or that it has deteriorated 5, 10, 15, 25 or 50 per cent.; not annually, but totally. The reasons for any particular percentage will develop as the result of inspection and a knowledge of the mechanical condition of the machine. The judgement will translate this condition into dollar loss, not by consideration in terms of dollars, but by consideration as a segregated item of the single question of mechanical deterioration.

The second class of specific depreciation, "obsolescence," is more complicated than the first. Under this general heading may be grouped a judgment of the depreciation due to the invention of a better or more useful machine; the going out of business of the maker, and the consequent special expense of repair or replacement; or the discontinuance of the process for which the machine was designed in the best of practice of the art.

Here is a machine for which the new reproductive cost is $1000, with an estimated scrap value of $100 and a depreciable value of $900. For mechanical deterioration we will imagine the depreciation judgment to be 20 per cent. and in the next step of judging obsolescence depreciation the appraiser will decide that because there are better machines, 5 per cent., in his opinion will cover the obsolescence depreciation at this time. Next year the new machines may be demonstrated to be so much better than the old, that the obsolscence depreciation would be so great as to reduce the worth of the machine to scrap value.

The third class of depreciation is in fact outside of the realm of the expert in the appraisal of the physical property. It is for the plant manager or the efficiency engineer to measure the depreciation due to "lack of utility." The machine may be without depreciation due to mechanical deterioration and obsolescence and still lack utility to such a degree that it is not a useful unit to the plant in which it is found. It may be a lathe in a plant in which lathe work is required but may be of little or no use because it is too large, too small, or lacks the special compliments necessary for the proper handling of the work at hand. It may be a printing press of the latest and best type but still unfitted for the character of printing which may constitute the largest part of its owner's business. In making physical plant appraisals, this class of depreciation is worked out only with the assistance and coöperation of the owner who may wish to measure his possible loss in the purchase of the machinery unsuited for his business. A form for recording data is shown in Fig. 1.

Lack of utility applies to buildings which are not suited to their sites. A splendid residence in a retail-business location is an example of such depreciation, which is altogether different from depreciation, due to mechanical deterioration and obsolescence.

The new Federal Income Tax law for the first time permits specific deduction for depreciation due to obsolescence. Heretofore under the old law, the Internal Revenue Commissioner's office did not recognize obsolescence depreciation as it accrued, but permitted deduction after complete obsolescence had occurred, and allowed the deduction of the entire valuation. Under the new law, obsolescence depreciation will be permitted as it accrues, and of necessity, depreciation of this class must be considered separately from "wear and tear and exhaustion," as the statute defines "mechanical deterioration."

Restraint of Trade in Patent Agreements

By CHESLA C. SHERLOCK

Probably in no one thing have our courts been more at variance than in the decisions handed down in regard to patents. If the judges of our Supreme and Federal courts differ so widely in their opinions in patent cases, how is the layman to determine what rights are conveyed to him by letters patent? It has been said that the only right granted to a patentee in the United States is the right to sue in the Federal courts. Patent litigation is both slow and expensive and the value of many a patent has been eaten up in defending its grants or in prosecution for its infringements.

IN A previous discussion, we examined the right of an employer to the patents and inventions of an employee. In the present instance, we shall consider a vastly more important subject; namely, the rights and privileges conferred on the patentee or the owner of the patent by the statutes and by the judicial opinions of the courts.

In the first place, it is necessary to understand something of the nature of a patent and what it attempts to do. The Constituion of the Federal Union expressly gives to Congress the power "To promote the progress of science and the useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

Patent rights, then, in so far as they extend, have their origin in patent laws and in the interpretation of these laws by the proper judicial authorities.

Because of the rapid development of our country in an industrial way, the right to patents has been a constant source of litigation even from the earliest times. The fact that there was commercial development at all is sufficient to show the reason why there has been a mad scramble for anything of a semblance of monopoly or freedom from competition.

The judicial interpretations in earlier times came from the United States Supreme Court itself, but in later times the great mass of judicial opinion on the subject of patents and patent rights has been tried before lower Federal courts. This statement may not mean much in itself, but its significance will be apparent later on.

At some stage in our judicial history, the Federal court (meaning the lower courts) came to a wide difference of opinion with what had come to be the settled law of the land as announced in the decisions of the Supreme Court. We find the Federal courts taking a view of patent rights entirely foreign to that announced again and again by the Supreme Court.

And because the question of whether the enforcement of "patent rights," as they are understood in view of the lower courts' interpretations, amounts to restraint of trade is obviously contrary to that of the Supreme Court, we will divide the matter into two heads, the decisions of the lower courts and those of the Supreme Court and allow the reader to draw his own conclusions.

It has been said in numerous decisions of the lower courts that the patent confers with it an absolute monopoly on the right to use, make and sell the patented article. And that since this right is grounded in patent law, so long as it does not conflict with the police power of the state, the Government must protect the patentee in its exercise. It is further said that since the patentee acquires a monopoly that he can do as he pleases in the exercise of that monopoly and can limit the sale, the use or the manufacturer of the article in any way he sees fit and that in so doing he cannot be guilty of restraint of trade, the Government having expressly guaranteed to secure him in his right of monopoly.

It has further been pointed out that the patentee can patent his invention and then refuse to use, make or sell it to others; he may refuse to do anything at all with his invention and there is no power that can compel him to do so so long as the life of the patent exists.

And in one decision it was said that cries of restraint of trade would not be heard because the Constitution, in attempting to promote the useful arts and sciences, created this very monopoly against which people are now crying out against.

It is not our purpose to mislead anyone as to the law upon the subject. We acknowledge the fact that these opinions are held by most of the lower Federal courts which have passed on the majority of patent cases during the past 20 years. But for some reason or other, these cases have failed to find their way to the Supreme Court. And in the event that they had reached that tribunal, we are of the opinion that the cases granting the right to patentees to virtually restrain trade and stifle competition or to control prices would be overturned.

This fallacy which has crept into the consideration of patent rights has reared up a gigantic false structure of right and privilege which is not just and which threatens the stability of our industrial welfare. And the fallacy has its root in this:

A patent does not *confer* the right to make, use and sell the patented article for a period of 17 years. It cannot confer that right simply because the right exists in every man to make, use or sell an article, so long as some one else hasn't patented it. The inventor has the right to make, use and sell his invention independent of any issuance of letters patent.

Then, if the patent does not confer this right, what does it do? It merely gives the patentee the exclusive right to exclude others from doing these things. There may not seem to be a great deal of difference between the two, but a moment's consideration will tend to show where the difference does lie.

Since the right to make, use and sell a given invention exists independent of any patent right, it is obvious that the right to do these things must not come from the patent law or the "monopoly" granted by it. It is, in fact, a common law right exercised by every man, antedating constitutions and statutes on the subject—a "natural right," as Justice Miller expressed it.

In one case, the court said: "A patent does not even confer the right to use the invention. The inventor had that right before. It is merely an incorporeal right to exclude others from using the invention, conferred by the Government upon compliance with certain

requirements, and is transferable according to the laws of its creation which the state statutes cannot affect. Patents can be reached under the bankruptcy law, because they are wholly subject to the laws of the United States."

Chief Justice Taney, in 1852, speaking in a decision, which by the way, seems never to have been overturned, said: "The franchise which the patent grants consists altogether in the right to *exclude* everyone from making, using or vending the thing patented, without the permission of the patentee. *This is all that he obtains by the patent.* And when he sells the exclusive privilege of making or vending it for use in a particular place, the purchaser buys a portion of the franchise which the patent confers. He obtains a share in the monopoly and that monopoly is derived from, and exercised under, the protection of the United States. And the interest he acquires necessarily terminates at the time limited for its continuance by the law which created it. The patentee cannot sell it for a longer term. And the purchaser buys with reference to that period; the time for which the exclusive privilege is to endure being one of the chief elements of its value. He therefore has no just claim to share in a further monoply subsequently acquired by the patentee. He does not purchase or pay for it."

The chief justice then went on to consider the rights acquired by the user of the patented article, and contrast this opinion with that more recently held by the lower Federal courts, which has permitted patentees to treat purchasers as licensee, rather than an owner of the patented article purchased:

"But the purchaser of the implement or machine for the purpose of using it in the ordinary pursuits of life, stands on different ground. In using it, he exercises no rights created by the Act of Congress, nor does he derive title to it by virtue of the franchise or exclusive privilege granted by the patentee. The inventor might lawfully sell it to him whether he had a patent or not, if no other patentee stood in the way. And when the machine passes to the hands of the purchaser it is no longer within the limits of the monopoly. It passes outside it and is no longer under the protection of the Act of Congress."

However, the lower Federal courts today do not hold to any such view, although the opinions of the Supreme Court become the settled law of the land as soon as announced. The lower courts hold to the opinion, based on the fallacy of *conferring* the right to use, make and sell the patented thing, that the patentee has a right to limit the use as well as the manufacture or sale and that he may virtually place the purchaser in the position of a licensee rather than as an owner. If the purchaser violates the provisions of his restricted agreement of sale, then he is to be treated as an infringer of the patent and is liable under an action for infringement.

Returning to the Supreme Court, we find Justice Harlan saying: "The sole operation of the statute is to enable him (the patentee) to prevent others from using the products of his own labor except with his consent. But his own right of using is not enlarged or affected. The right of property in the physical substance, which is the fruit of the discovery, is altogether distinct from the right in the discovery itself, just as the property in the instruments or plates by which copies of a map are multiplied is distinct from the copyright of the map itself."

In 1896, Justice Brewer said: "The only effect of it was to restrain others from manufacturing and using that which he had invented. The patentee, so far as his personal use is concerned, received nothing which he did not have without the patent. The purpose of the patent is to protect him in his monopoly, not to give him a use, which save for the patent, he did not have before, but only to separate to him an exclusive use."

In 1883, Justice Miller said: "It is to be observed that no Constitutional or statutory provision of the United States was or ever has been necessary to the right of any person to make an invention, discovery or machine, or to use it when made or to sell it to someone else. Such right has always existed and would exist now, if all patent laws were repealed. It is a right which would be called a natural right, and which so far as it may be regulated by law belongs to ordinary municipal legislation; and it is unaffected by anything in the Constitution or patent laws of the United States."

In another case, it was said: "By the terms of the patent, he has the exclusive right to make, use and vend. The right to make, use and vend he has without the grant of letters patent. When we say that a patent grants an exclusive right, we do not mean that the right to make, use or vend is granted, but only that the patentee's existing right is made exclusive by the grant."

Walker, a recognized authority, says: "A patentee has two kinds or rights in his invention. He has a right to make, use and sell specimens of the invented things; and he has a right to prevent all other persons from doing either of these acts. The first of these rights is wholly independent of the patent laws; while the second exists by virtue of those laws alone."

If, as some of the more recent decisions tend to assume, the patent confers an exclusive right to make, use and sell the patented article, then the patentee, in this exercise of rights, is acting under the protection of the patent laws, and hence is subject to no limitations except those imposed by these patent laws.

If this be true, then the whole existing fabric of the law of sales, contracts and trade restrictions is swept aside entirely, so far as their relation to patented articles is concerned.

Under the existing theory the patentee is permitted to fix resale prices on his patented article, both to jobbers and dealers, as well as so labeling the article itself with restrictions as to its use that when it passes into the hands of the consumer or user, he is bound to do only one thing with it or find himself guilty of infringement of the patents of the patentee!

Do not be mistaken about this matter. The practice has been permitted to grow up for the reason that few of the cases have ever passed beyond the lower Federal courts and they have clearly adopted a view of the matter which would fail if taken to the Supreme Court.

The patentee may enjoy the privileges allowed by these decisions for a time, but they will ultimately fail for the reason that the Federal Government, under the Constitution has no power to grant the *right* to make, use and sell an article, that right having existed prior to the adoption of the Constitution and being reserved in the people, never having been expressly granted to the Federal Government.

The only power granted by the Federal Government was the power to *protect* the already existing right to make, use and sell inventions.

The fallacy of the existing theory can be further illustrated by saying that if it is true that the granting of letters patent confers the right to make, use and sell, then a refusal to issue letters patent denies that right!

In the Northern Securities case, it was said: "Harm, and only harm, can come from the failure of the courts to recognize the fundamental principle of Constitutional construction. To depart from it because of the circumstances of special cases, or because the rule in its operation may possibly affect the interests of business, is to endanger the safety and integrity of our institutions and make the Constitution mean not what it says, but what interested parties wish it to mean at a particular time and under particular circumstances. The supremacy of the law is the formation rock on which our institutions rest."

The difference has come in this particular: the patent confers an exclusive right, not to make, use and sell, but to prevent others from doing these things. It may be urged that this amounts to the same thing, but there is a great difference and that difference has permitted patentees virtually to restrain trade and control prices on resale, as well as limit the ownership of the purchaser.

The patentee who wishes to know definitely what rights he has, can be safe in saying that he has the exclusive right or monopoly to prevent others from using, making or selling his invention for the period of the patent, but if he wishes to be well within his legal bounds he should not say that he has had conferred upon him the exclusive right to make, sell and use the article, because that is not technically true, and he may find the bottom dropping out of any elaborate system of selling and price fixing he may establish if he does adopt that attitude.

Theory, Experience, or Both?

BY HARRY SENIOR

Now that the treaty is signed and the war is officially ended; now that the League of Nations has rendered further war theoretically impossible, let us calmly and dispassionately discuss the reasons why it lasted so much longer than it ought and cost so much more than it theoretically should have done.

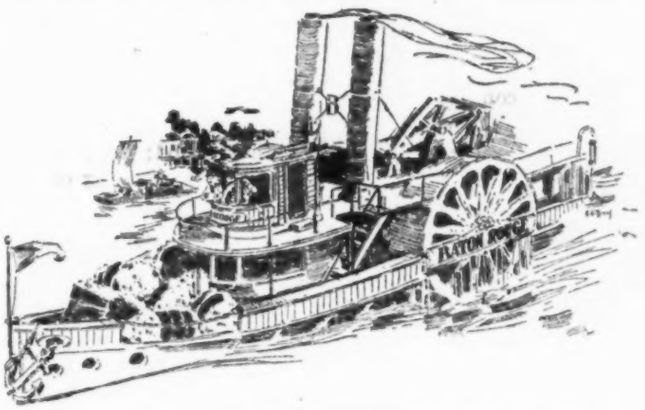
Let us endeavor to figure out how the Aircraft Production Board came to lose that six hundred and twenty-five dollars—or millions of dollars, was it?—that begat the miles upon miles of scare-heads in the newspapers. Let us see if there isn't a reason for not having any Browning guns in the field six months after we promised to have the whole surface of France covered to a depth of four feet with Browning guns.

Let us try to discover the jinx that prevented us from launching more ships in the last half of 1918 than the whole world had built in the preceding four hundred years. And while we are in the exploring business, let us ask ourselves why the railroads—with the hauling of freight over the shortest routes without duplication of service, with passengers on the roofs and hanging from the windows of every train, with freight terminals piled high with barrels, boxes and crates while the surplus overflowed the surrounding territory—cost us "steen" million dollars more to run them last year than it did the year before.

Not all of the bad things that we read in the papers was so, and, besides, the testimony was all on one side. While we read in detail all about the things we said we would do but didn't, we learned very little about the stupendous things which we *did* do.

But there is nothing to be gained by patting ourselves on the back; we must all admit that, however well we did, we ought to have done better. When the impossible has happened and we are again confronted with the likelihood of getting our national throat cut, our circumstances will be infinitely better if we take such steps now as are necessary to correct the condition that led to error in the past.

My own guess at the cause of the trouble is that we have too much theory and not enough practice; that too many of our young men have tried to follow the



royal road to success and ignored the strait and rocky pathway that was recommended to the footsteps of our fathers; that the boys would rather go to a popular school or college and learn engineering out of a book (and incidentally have a gay old time while doing it) than to climb into a suit of stiff overalls and learn the business by actual contact with the machinery and materials of their trade, running the chance of skinning their knuckles and straining their muscles in the process.

We have learned beyond question that the war was a "war of engineers." We would have guessed that, even if the papers had not kept us informed. The side that trusted in God, kept its powder dry, and *made the greatest quantity of the most effective machinery* was bound to win; and right here, though we did not fall down, we barked our shins.

From the beginning of our participation in the war, engineers were in demand and their credentials were not subjected to too close scrutiny. It is not surprising that, in the rush, men were sometimes drawn or even forced into positions they were in no wise qualified to fill. It cannot be doubted that the solution of many intricate problems was left to minds which had no natural aptitude for untangling them.

This does not imply that such men were deliberate grafters; that they did not labor honestly and faithfully to discharge their duties; rather, our standards by which we determine a man's qualifications are too lax or too uncertain. It is quite possible to know things that are not so; it is also possible, and even common, to *think* we know, only to learn when we are confronted by actuality that we are uncertain of our knowledge. Therefore, before turning a man loose on a job where millions of dollars and thousands of human lives may depend upon his judgment, resource, and confidence, we must know beyond the possibility of doubt that he possesses the required qualifications, and we don't want to take his word for it, either.

I remember a story told by Mark Twain of his own cub days on the Mississippi: The huge floating palace on which Mark was a pilot's apprentice was about to make a "cross-over" when Mr. Bixby, the pilot, developed a sudden and unconquerable appetite for pie.

"Boy," he demanded, "How much water in that crossing?"

"Couldn't touch bottom with a church steeple," replied young Twain.

"All right," said Bixby, "you take her over, I am going below for a piece of pie."

Proud to be left alone with such responsibility upon his young shoulders, Mark spun over the wheel and brought the steamer's nose to bear upon a distant point diagonally across the river. All went well for a few minutes until the captain (whom Mr. Bixby had "met" on his way below) stepped out in view of the boy and cast an anxious look around.

That was the entering wedge of doubt. Young Mark began to wonder if there was not a rock or some-

thing under the placid surface of the water that his education had failed to encompass; he began to see manifestations of hidden shallows; over there was a faint wrinkle which his training told him indicated a bluff reef; just beyond, a ripple denoted the presence of a dangerous snag; he could almost see the yellow sandy bottom shining through the water. The cold perspiration induced by fear commenced to ooze out of his pores and in a weak halting voice that was the very antithesis of the crisp commanding tone he would have used a few moments before, he ordered out the leads.

Alas! the leadsmen had also been "seen" by Mr. Bixby and their first lugubrious reports confirmed the young pilot's worst fears. He didn't *know*—he only *thought* he knew. The bottom the leadsmen reported could not only have been touched with a church steeple, but a yard stick would almost suffice.

Mark clawed the spokes of the wheel wildly one way and then another to keep off the shoals that were reported first to starboard and now to port, until he was on the verge of collapse. His last despairing act was to bawl down the speaking tube with what was left of his voice to "Ben," the engineer, to "back her! If you love me, Ben, back the immortal soul out of her."

At that moment, Mr. Bixby, bearing a large chunk of pie in his fingers, stepped quietly into the pilot house. Instantly the shoal and dangerous channel became bottomless and safe. Confidently the embryo pilot rang the engines ahead. Serenely the big craft again pointed her nose to the almost-as-far-distant point and went swimmingly on her course.

The details of the lesson which Mr. Bixby pounded into young Mark's cranium cover several pages of the later Mark's book, but the gist of the matter is that the young man had been steering the steamboat by second-hand knowledge. The superstructure of his education was there, but it was not founded on the masonry of experience. Many of our would-be engineers would consider themselves indeed fortunate if their Alma Mater could step out from behind a smoke-stack at a critical moment.

It is not my intention to deprecate the engineer-by-education, but to point out that the mere acquirement of knowledge from books or from the experiences of others—the ability to pass an examination and to exhibit a diploma—does not constitute an engineer.

To be sure, a college or school of accredited repute does not grant diplomas without reason, but it does of necessity grant them to men who are without real practical experience; men who may know, but who are not yet certain that they know, and who, upon encountering a chain of adverse circumstances, may find themselves in the same plight as was the young pilot when the leadsmen lied to him.

E. J. S. Halvorsen, writing upon the subject, "Apprentices, Here and in Europe," page 77, *American Machinist*, brought out as a fundamental difference in practice that in Europe the apprentice was obliged to actually make something pertaining to his trade; and to make it under conditions unfamiliar to him, before he was granted his certificate. He was obliged to go into a strange shop; work with somebody else's tools; work under the critical eyes of strangers and rivals; very likely he was intentionally misled by specious advice. Not only was his knowledge of his business tested, but also his self-reliance.

It is not necessary to tell me that an engineer is not a pattern maker or a machinist. I am aware of the difference in his requisite knowledge; in the scope of his activities: but the difference is one of degree only; the principle remains the same.

I do not consider myself qualified to point out the remedy, but I believe that some means should be devised by which a properly accredited college may ascertain beyond a doubt that the candidate for a degree is fully competent, both from a practical as well as a theoretical standpoint, to handle his job; and to discourage the granting of certificates, diplomas, or degrees by schools that are themselves an insufficient guarantee of ability.

It is necessary for our engineers—the men upon whom the country depends to get things done well and quickly at a most critical time—not only to know their business, but to *know* that they know it; to possess, in addition to the knowledge of means, the certainty and sureness of action; the unwavering self-reliance that can only be founded upon the solid rock of experience.

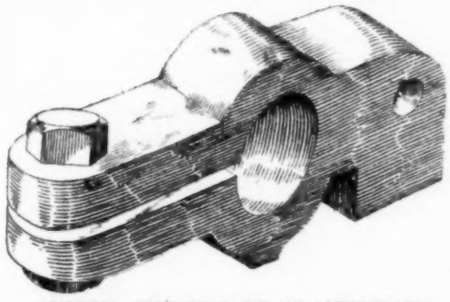
The men in high positions, on whose acts our fortunes and perhaps our lives are depending, must be capable and self-reliant; sure in their knowledge that the course they are following leads only to success. If they are depending upon the knowledge and experience of someone else, Heaven help us all if that somebody else goes away just when the bottom falls out of everything.

Cost of Making a Pair of Offset Centers for a Crankshaft

BY MARTIN H. BALL

I took great interest in reading the article, "Cost of Making a Pair of Offset Centers for a Crankshaft," by W. D. Forbes on page 300 of *American Machinist*. The work described showed thorough planning in a shop where good housekeeping prevails; as was indicated in the last two paragraphs where it was noted that there was a good assortment of standard tools and appliances on hand, that they all had places assigned to them, and that they were kept in those places when not serving their essential purposes.

I do not think the time of 13 hr. was excessive. In the average shop under average conditions it would frequently be more for doing the job in the way described—but I am prompted to suggest another method,



OFFSET CENTERS OF CRANKSHAFT

calling attention to principal features of design and estimated time for its making, as likely to be of interest.

The equipment here shown was made recently, varying somewhat in the amount of throw and size of shaft, but the time was not kept separately on the fixture; therefore, it is necessary to estimate that part of the cost.

It was made of cast iron. The pattern was sawed out of a plank of proper thickness on a band saw and the hole for the shaft bored with an expansion bit. This hole was cast with a green sand core.

The slot was cored by placing core prints on the top and bottom of the pattern and making the corebox ⅛ in. narrower than the distance from the outside edge of the casting to the finished edge of the bore for the shaft. The core was placed flush with the outside end of the casting, thus leaving solid metal at the bore for ease and accuracy in the boring operation.

There being but two castings required, the pattern was not highly finished and probably required about 1½ hr. to make.

The plan of clamping the shaft was chosen because of its almost perfect fit and consequently good and accurate holding power, and also of its affording a means of secure holding without marring the finished shaft.

1st Operation—Both sides are planed, rough- and finish-cut. Estimated time, 2¼ hours.

2nd Operation—With one casting placed on top of the other and clamped to the lathe faceplate by straps, the hole for the shaft is bored. Estimated time, 1½ hours.

3rd Operation—The offset center hole is laid out on one casting on a surface plate and the holes for the clamping bolts are laid out. Estimated time, ½ hour.

4th Operation—The two ¾-in. clamping-bolt holes are drilled. Estimated time, ½ hour.

5th Operation—The ⅛ in. of stock left in the slots is cut with a hand hacksaw. Estimated time, ¼ hour.

6th Operation—The castings are placed together true, with the arbor through the hole for the shaft, and clamped on the arbor with the bolts. The ⅜-in. hole for the centers is drilled and reamed on a drilling machine through both castings. Estimated time, ¾ hour.

7th Operation—A ⅜-in. arbor is forced through these holes; the parts are set up with centers level and the two bosses shown on the edge of the fixtures rough- and finish-planed. Estimated time, 1½ hours.

8th Operation—The offset center holes are countersunk on the opposite sides of the castings making them right and left. Estimated time, ½ hour.

Total time, 9 hours.

The offset center holes were countersunk to a diameter of 1 in. thus providing an unusually large bearing surface to prevent excessive wear. For the limited number of shafts to be turned this method was satisfactory. If a great amount of work were to be done with the fixture it would have been advisable to bore these holes larger and insert hardened-steel bushings in the way Mr. Forbes did.

Holding Arbors While Quenching

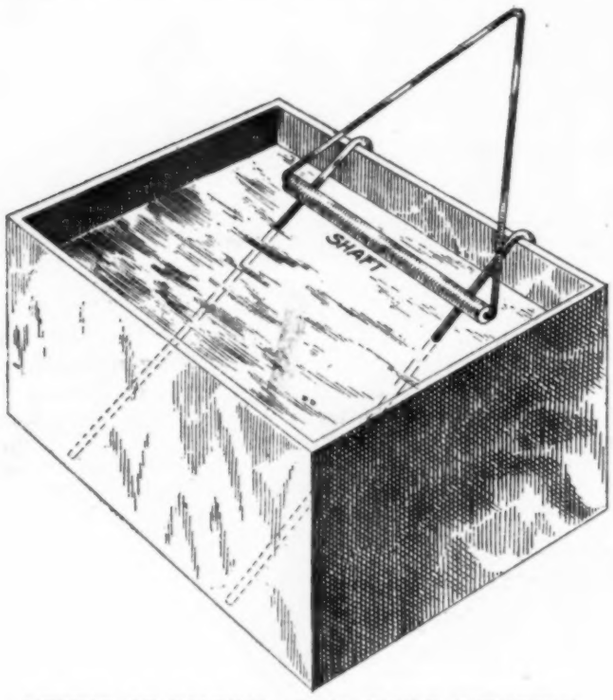
BY E. B. WARD

Recent articles published in the *American Machinist* relative to different methods of holding pieces while quenching bring to mind the way we used to hold arbors, mandrels, and other comparatively short pieces having centers.

A piece of ¼- or ⅜-in. round cold rolled steel of suitable length would be pointed at each end and then bent into the form of a bail or handle as shown in the sketch, the center points being of the right distance apart to be readily sprung into the centers of the piece to be hardened after the latter had been brought to the hardening temperature.

Two pieces of steel or iron were then laid in the quenching tank, one end of each at the bottom of the tank and the other end leaning against the top edge at the opposite side so as to form an inclined runway.

When the piece to be hardened had been properly heated it was taken from the fire, the bail sprung into the centers, and the piece rolled up and down the



METHOD OF HOLDING ARBOR WHILE QUENCHING

improvised runway, under water, until it was cool. By this method a piece would rarely spring more than two or three thousandths of an inch.

Compensating Spring Plungers in Jigs and Fixtures

BY G. A. VIS

In the design of jigs and fixtures for machining light castings, it often becomes necessary to use some method for supporting the lighter sections to keep them from springing away from the pressure of the cutter. This is particularly true of such castings as automobile crank cases, cylinder blocks integral with the upper half of crankcase, transmission cases, etc. These parts are usually located in the fixture on three or more solid locating buttons, and on account of the light sections employed, it is essential to support the casting between these points in order to produce a true face in the finished part. In a rough casting, irregular in form, it is impossible to use more than three or four solid resting points without springing the casting in clamping.

The usual method of overcoming this difficulty is by the use of spring plungers, shown in Fig. 1, suitably spaced between the locating points. These plungers consist of hardened and ground pins *A* from ½ to 1 in. in diameter, according to the size of the work, and are free to move in reamed holes in the jig castings *B*. They are supported by springs of just enough strength to bring them in contact with the work. After the work has been placed in the fixture and the clamps in place, but not tightened, the spring plungers are locked in position by a setscrew *C* which forces the hardened shoe *D* against the angular flat on the plunger. This angle should be about 3½ to 4 deg. which is ample to keep the pressure on the work from forcing the spring plunger down. By this method a series of solid variable supports, to suit each individual casting, are produced.

The method, as examined above, is the standard method of applying spring plungers to this class of fixtures. However, for the crank-case casting of a large six-cylinder motor it is necessary to support it at least every 3 in. around the joint to be milled. Therefore, it can be readily seen that locking and unlocking 20 or 30 spring plungers every time a piece is machined becomes very tedious and makes the fixture-loading time out of proportion with the cutting time.

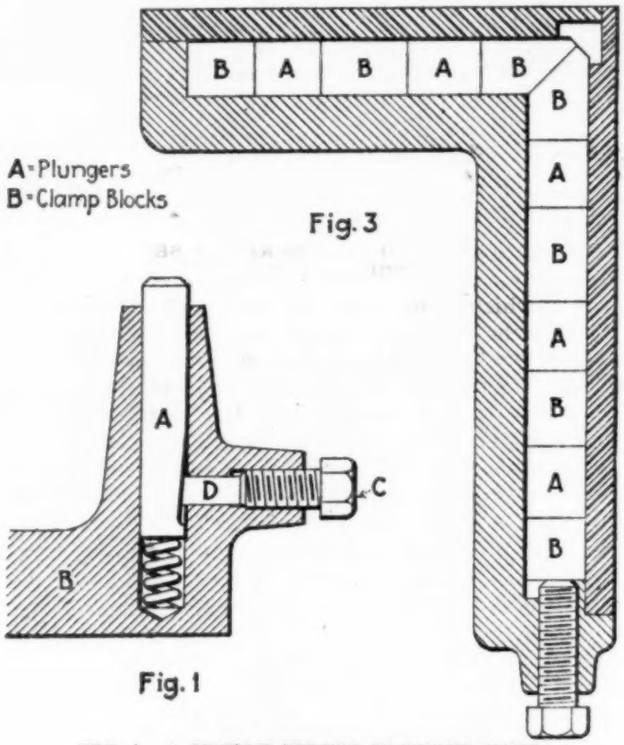


FIG. 1. A SIMPLE SPRING PLUNGER UNIT
FIG. 3. CORNER LOCKING BLOCKS

Fig. 2 shows a method of applying spring plungers to fixtures which not only has all the advantages of the previously described method, but has the additional advantage of being able to lock all the spring plungers at once, thereby materially cutting down the loading time.

In this method the plungers are spaced to suit the casting and are free to move in reamed holes. The plungers *A* rest upon, but are not attached to, the blocks *B* which are free to move vertically and horizontally in the slot in the casting and are supported upon springs of sufficient strength to bring the plungers up to the work. These blocks are spaced by the blocks *C* which have only endwise movement in the slot. Examination of the drawing will show that loosening the lock screw *D* allows the springs to bring each plunger up to the work, and that tightening the lock screw clamps the entire assembly in whatever position it happens to be in. The included angle on the sides of blocks is 7 to 8 degrees.

Having proceeded this far in designing a fixture, it is necessary to provide some means for protecting the plungers from dirt, chips, water and dust. Avoid using felt wipers as they are a snare and a delusion. At the best their service is only temporary, since they are rap-

idly disintegrated by the action of soda water and when used dry they soon load up and act as a lap.

Better protection for the plungers is afforded by pressing hardened bushings *E*, Fig. 2, into the fixture casting. The bushings should project above the casting according to the travel of the plunger. Shrouds or

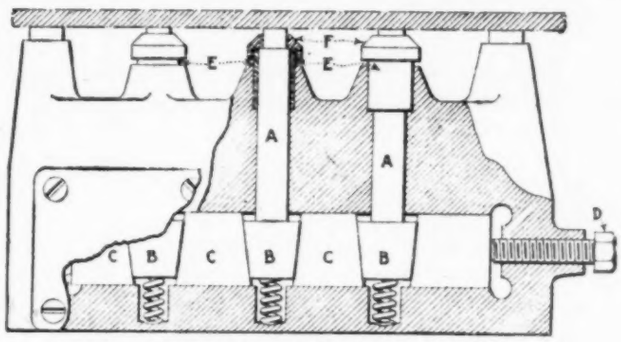


FIG. 2. METHOD FOR LOCKING A SERIES OF SPRING PLUNGERS

caps *F* which completely cover the bushings are then fitted to the plungers.

The above method can be varied so that a series of plungers other than those in a straight line can be locked with the same screw. It is possible with suitable angles on the corner blocks to carry the motion around a corner as shown in Fig. 3. The writer has produced fixtures which have plungers around a complete circle, all locking by one screw. The above method is in accordance with practice in several of our largest automobile plants.

Making a Special Double-End Socket Wrench

BY I. E. PEARCE

One of the many varied manufacturing problems of a jobbing machine shop is shown in the socket wrench and wrench bit, Fig. 1. The wrench *A* which takes special hexagon and pentagon nuts is made from ½-in. drill rod with a tug pin *B* on which the wrench bit *C* engages. While the making of the wrench bit employed the usual turning, milling and hardening processes, the wrench presented several problems which involved considerable interesting development work.

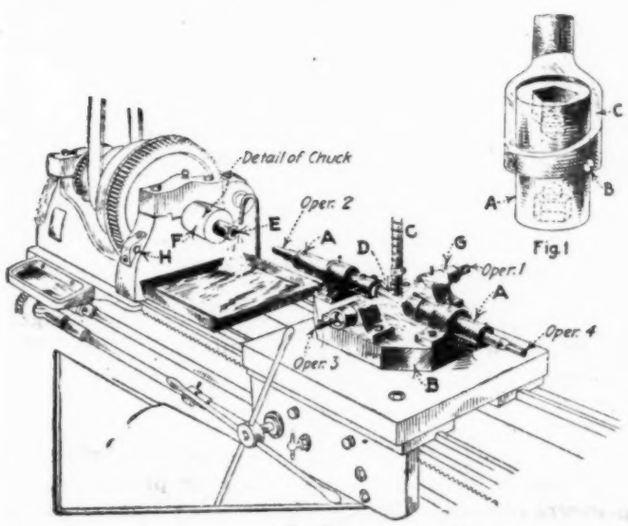


FIG. 1. SPECIAL SOCKET WRENCH AND WRENCH BIT
FIG. 2. DRILLING AND DRIFTING THE SOCKETS

As drifting is the logical method for finishing the holes, an engine lathe was fitted up so that this could be done in one set-up, thus minimizing the handling by confining the operations to one machine.

The drifting was accomplished by two modified No. 2 pneumatic chipping hammers A, Fig. 2, delivering approximately 1200 blows per minute and mounted on a special turret head *B* fixed to the regular lathe carriage. Connections with the air line are afforded by means of the hose *C* and the swivel connection *D*. The wrench blank *E* is held in position in the universal chuck *F* and in operation No. 1 a hole twice the depth and slightly smaller than the diameter of the inscribed circle of the finished hole is bored by the drill held in the chuck *G*. The live spindle of the lathe is then locked by the taper pin *H* and the turret is revolved until the hammer and drift are in position for the drifting, operation No. 2, suitable stops being provided to regulate the advance of the drills and drifts. With one end completed, the blank is reversed in the chuck and operations No. 3 and No. 4 are performed on the other end which completes the finished holes. An average of 40 parts per hour is maintained.

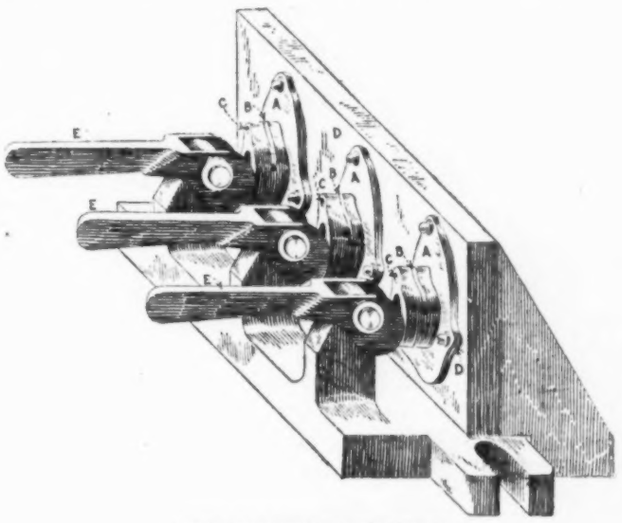
The hole for the tug-pin is now drilled in a simple V-block jig and the pin assembled, after which the part is agitated in hot soda water to remove the oil and chips. While the initial cost of this arrangement was somewhat high, the saving in time and labor has been very satisfactory, and the idea has suggested many changes in the manufacturing of other parts.

A Slitting Fixture

BY GEO. H. THOMAS

An efficient multiple fixture for slitting thrust adjustment caps on a milling machine is shown in the accompanying illustration. Features worthy of note are the simplicity of design, the lack of intricate details and the general accessibility.

The thrust caps *A* are slit at *B* so that binding screws in the holes *C* effect a lock on the threads in the large



THE SLITTING FIXTURE

holes of the caps. The caps are held by eccentric clamps operated by the levers *E*, and are located by the removable pins *D* which also take the thrust of the cut.

By using the hand feed while "cutting air" and the power feed for the slitting a generous output per day is possible.

We Are For The Working Man

A man asks us "Why do you continue to fight the working man?" We are not fighting the working man. We are fighting the mad dogs that are trying to bite the workmen of America.

The men who work in American machine shops have never had a better friend than the "American Machinist." You know that. You know that for 40 years we have consistently led the way to better working conditions; have successfully urged higher wages and shorter hours; have led in the development of education; have put before you new and better machine-shop methods. We have written hundreds of helpful personal letters to ambitious workers of every rank pointing out the way to advancement or helping them to solve some perplexing problem. Many a one of you who read this can attribute part of his present success to the "American Machinist"—we say this because many have written and told us so.

Do you think that after 40 years of consistent and earnest support we have now gone back on the working man?

The mad dog of Russia has bitten many of the self-appointed leaders of organized labor in America. They are afflicted with rabies.

They are encouraging you to strike, to tie up production, to refuse to arbitrate, to demand instead of to confer. Every such act is turning public opinion against you; and American public opinion—the love of the square deal—has been the main strength of the working man. They are systematically fostering class hatred in your hearts, are preaching contempt of law and order, are encouraging you to defy the laws of the United States Government and disregard the solemn warnings of the President. What do you gain, by turning against you this Government—the best working man's government that the world has ever known? If these mad dogs alone would suffer it would be of little consequence. But their mania is to infect others. Else there is no profit in it. You are being betrayed for a few pieces of silver.

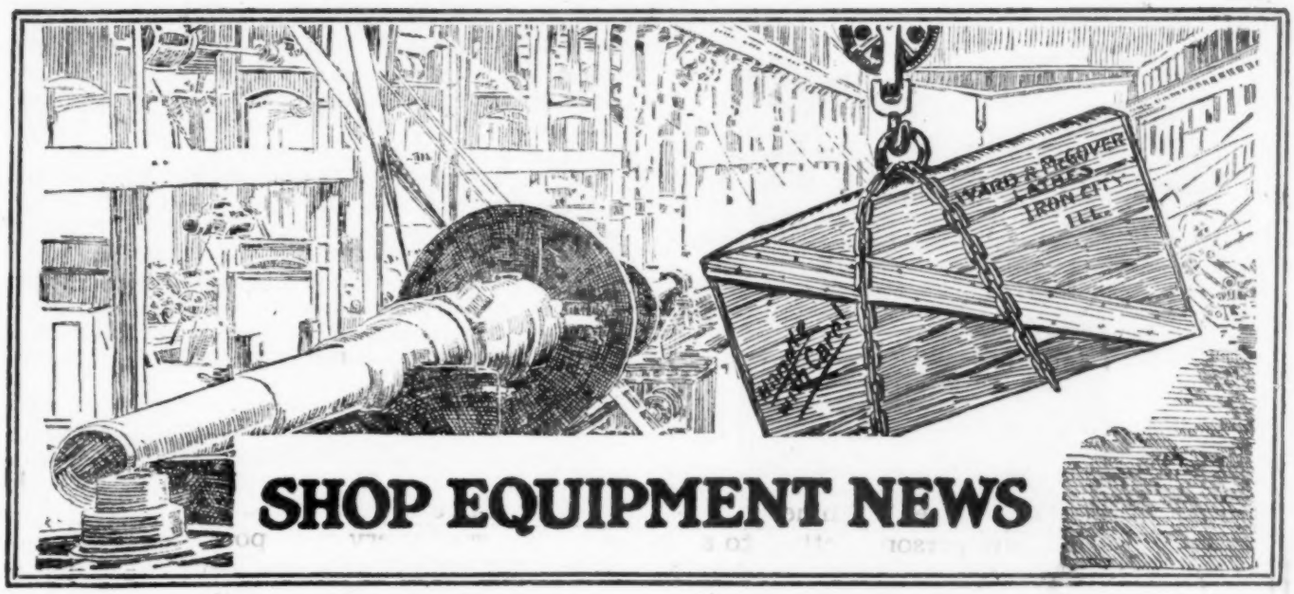
* * *

The whole country is turning against these mad dogs.

One mad dog at large in a community makes harmless dogs abhored and dreaded. The mad acts of union agitators are discrediting all labor. The innocent party will as usual be the one to suffer most.

That is unless you 90 per cent. of American workers who are independent of unions, and you union men who resent the dictation of so-called organizers, refuse any longer to let self-seeking, loud-talking and soft-handed agitators pull you from the pedestal of public estimation, alienate you from your Government and turn every decent man's hand against you. You must clean your own house. As a true friend of the American worker, the "American Machinist" warns you to chain these mad dogs before it is too late.

(Additional copies of this editorial will be furnished on request.)

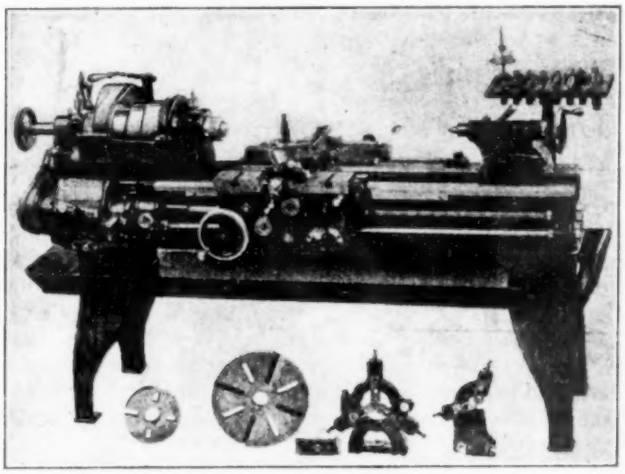


SHOP EQUIPMENT NEWS

"Economy" 14-in., Double Back-Geared, Quick-Change Engine Lathe

The Rockford Lathe and Drill Co., Rockford, Ill., has redesigned its "Economy" 14 in., double back-geared, quick-change engine lathe which is shown in the illustration. This lathe is designed to meet the demands for a small heavy-duty machine of sufficient weight and power to handle the production of the up-to-date manufacturing plant.

The bed is of deep cross-section having cross-braces at short intervals and is extra heavy. The headstock is firmly bolted to the bed, has a three-step cone, and the double back-gears are provided with a safety device that prevents them from "locking." The spindle is of high carbon steel with ground bearings. End thrust is taken by alternate collars of hardened steel and bronze. The tailstock is of the offset type, allowing the compound rest to be set parallel with the ways, and can be set over for turning tapers. The tail spindle is locked by a clamp which does not require the barrel to be split. The carriage has a wide bridge and the bearing on the ways is 20¼ in. The thread indicator which can be disengaged when not in use enables the operator to catch any pitch of thread without reversing the lathe. The apron has double bearings for all shafts and the gears have wide faces and coarse pitch. All feeds can be reversed in the apron and it is impossible to engage the turning feed while the nut is closed on the lead screw. The gear box provides for 32 changes of feed through sliding steel gears and hardened-steel clutches.



"ECONOMY" 14-IN., DOUBLE BACK-GEARED, QUICK-CHANGE ENGINE LATHE

Specifications: Swing, over ways, 14⅛ in., over carriage, 8 in.; distance between centers with 6-ft. bed, 37 in.; lengths of bed, 6 ft., 8 ft. and 10 ft.; spindle bearing (front), 2⅜ x 4 in., (back), 1⅞ x 3 in.; hole through spindle, 1 5/16 in.; ratio of back gears, 3.42 to 1 and 9.07 to 1; width of belt, 2½ in.; spindle speeds, 20 to 435; will cut threads from 4 to 56 per inch; feeds, 18 to 252 per inch; weight with 6-ft. bed, 1600 lb.; shipping weight, with 6 ft. bed, 1850 pounds.

Ott 6 x 6-in. Internal Grinding Machine

The Ott Grinder Co., Indianapolis, Ind., has added to its line an internal grinding machine of 6 x 6-in. capacity as shown in the illustration. The base is of the cabinet type and rests on a three-point bearing to eliminate strains. The bed is strongly ribbed, provided with oil pockets and grooves and is secured to the base by bolts through three-point bearing pads. The table is a solid casting weighing 350 lb. and the drive is by steel rack and pinion through a steel worm and bronze wormwheel, driven from a four-speed transmission case. Accuracy of reversal is accomplished by a device in the transmission case which operates the clutches. Work can be started or stopped at the headstock by shifting the belt.

The spindle is of high-carbon steel, heat-treated and ground. It revolves in Non-Gran bearings, adjustable for wear and provided with ample means of lubrication. The nose of the spindle is threaded on the outside and tapered on the inside to receive spring collets having a range of 1-16 in. to 1 in. in diameter. A quick-closing, lever-operated device is provided for use with the collets. This method of operating the collets is said to be positive in action and as quick as an air chuck, without the expense of air, and adjustable for tension of grip.

The water guard completely incloses the chuck and work, yet allows easy accessibility. Water may be introduced from either end of the spindle.

The wheel stand is a solid casting weighing 325 lb. and carries the wheel spindle which is mounted in three double-row SKF ball bearings. It also carries the jack pulley for increasing the speed from the countershaft to the wheel pulley. The jack pulley is mounted on

OTT 6 X 6-IN. INTERNAL GRINDING MACHINE

Specifications: Swing, without guard, 12 in., with guard, 10 in.; will grind hole 6 in. in diameter; table travel, 24 in.; will grind tapers 120 deg. included angle; automatic crossfeed, 0.00025 in. to 0.003 in.; diameter of work-spindle bearings, 2 in.; hole through work spindle, 1¼ in.; speed of countershaft, 600 r.p.m.; main pulley, 15 in.; work speeds, 85 to 425 r.p.m.; spindle speeds, 8000 to 20,000 r.p.m.; table speeds, 16 in. to 50 in. per minute; floor space, 38 x 70 in.; weight, 1950 lb.

Hyatt high-speed roller bearings and swings on an adjustable arm to compensate for the stretch of the endless driving belt.

Various sizes of holes are ground by using suitable quills which fit on the tapered nose of the wheel spindle and eliminate the need for providing several complete heads and spindles. The wheel, when withdrawn from the work, is automatically covered by a guard which is adjustable to suit the different lengths of quills.

The equipment comprises a 12-in. faceplate—a combination straight and radial wheel-truing device—a 9 in. collet chuck—a pump and complete overhead works.

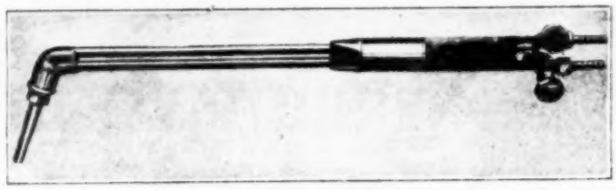
Airco Welding Torch

The Air Reduction Sales Co., 120 Broadway, New York, has introduced to the trade a welding torch capable of meeting the varied requirements of modern welding.

In the Airco torch illustrated herewith, the manufacturer has aimed to produce apparatus that would meet the requirements of the practical welder. The torch is of very strong construction, yet at the same time is so light and well balanced that the operator will not experience the usual strain when welding a long job. The handle is knurled and comfortably proportioned so that a firm grip can be secured without undue pressure. A new feature is a gas pressure table rolled on the upper part of the handle. Such a table is very handy for refernce and this location proves a convenient place for the information.

The valve handles are easily turned and will not catch in the operator's work or clothing. Both the handles are on the left side. With this construction and with the hose connections extendnig straight out from the valve body, there is nothing to interfere with the proper manipulation of the torch.

All passages are so designed and the parts so assembled as to insure an easy flow of gas. The tubes between the head and handle are of hard-drawn seamless brass, countersunk at both ends. The gases are mixed at the entrance to the discharge passage of the tip and it is claimed there is no premature mixing or mixing in other than the predetermined quantities. Whenever a new tip is put in place, the mixture is auto-



AIRCO WELDING TORCH

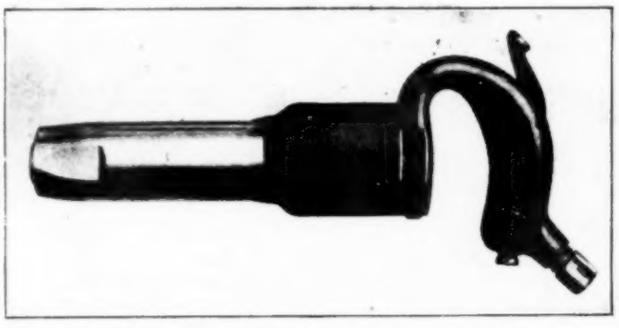
matically proportioned to the size of the tip and it is said that backfire or flashback has been eliminated.

The conical projection of the head co-operates with the conical recess of the tip in a metal to metal seat. The tip is held securely in place by a nut. This does away with threads on the tip as well as eliminating outside threading on the head. The tip is made of a special alloy selected after an extensive series of heat and endurance tests. The acetylene grooves are accessible and but a few seconds are required to remove carbon if cleaning becomes necessary. The torch head is drop-forged of the same material as the tip, so that both these parts are subject to the same coefficient of expansion and contraction.

The torch is made in four different sizes, adaptable for all classes of welding from sheet metal to heavy castings. Different heads are also provided for special requirements.

The Keller-Master Sure-Lox Chipping Hammer

The Keller Pneumatic Tool Co., 20 East Jackson Blvd., Chicago, Ill., has placed on the market a chipping hammer known as the Keller-Master Sure Lox, the noteworthy feature of which is the manner of locking the handle to the cylinder. It is claimed that the Sure Lox locking device eliminates the old style clamp bolt which is claimed to have been objectionable in some cases. The manufacturer states that the method of attaching the handle is exceedingly simple and efficient,



THE KELLER-MASTER SURE-LOX CHIPPING HAMMER

and that the handle is locked in a positive and rigid manner directly to the cylinder. This locking is accomplished by means of a key inserted in the cylinder engaging one of a series of locks in the handle. The key is held securely in place and the entire locking arrangement covered by a neat spring clip.

Another feature claimed is the extra long striking end on the piston, where 5-8 in. is provided instead of the 3-16 in. commonly used on clamp bolt types of hammers. This hammer may be furnished with either open or closed handles, piston type of throttle valves, round or hexagon bushings, or other features as specified on e order. It is made in ten sizes ranging from 1¼-in. to 4-in. stroke with piston diameters of 15-16 to 1 3-16 in.

Barber-Colman No. 2 Gear-Hobbing Machine

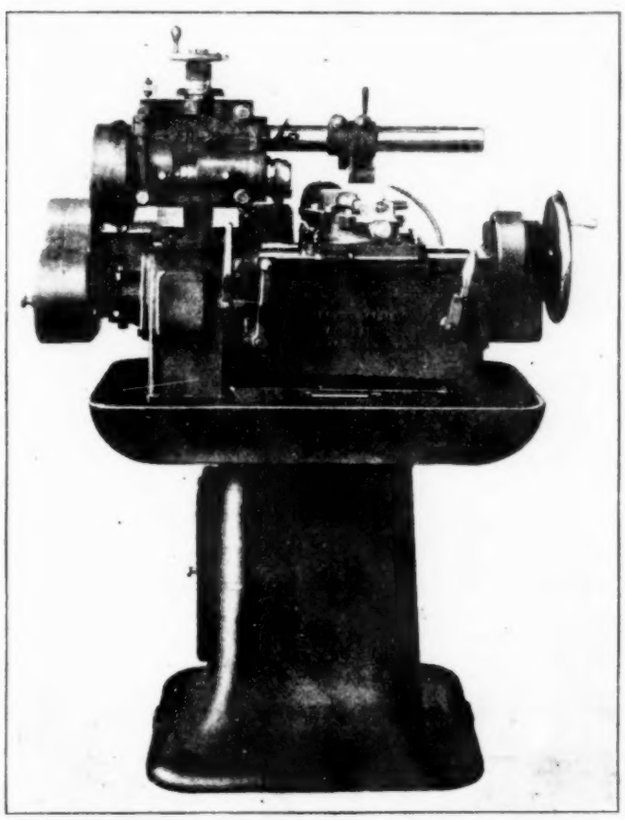
The Barber-Colman Co., Rockford, Ill., has added to its line of tools a small hobbing machine, designated as No. 2, which is shown in the illustration. The bed and upright of this machine are cast integral and are of heavy box-section reinforced by deep ribs. The sub-base is also of box section and contains a large integral oil tank. As may be seen, the work spindle is horizontal. Provision is made for projection of long shafts through the spindle and the work can be conveniently handled and clamped close to the spindle bearing.

The work spindle is of forged crucible steel, accurately ground and its bearings are conical at the front and straight at the back. Both bearings run in long bronze bushings in which provision is made for adjust ment due to wear.

An overhangng arm is provided to steady the work, this being essential to the production of accurate gears. Indexing the work is accomplished by a hardened and ground steel worm and a bronze wormwheel inclosed in an oil-tight gear case.

The hob spindle has a conical front bearing, is hardened and ground and runs in bronze bushings. The construction of the hob swivel and slide locates the hob close to the ways, securing rigidity. A vernier reading to 10 min. of arc insures accuracy of setting. The machine can be fitted with either a right- or left-hand hob swivel. The former accommodates spiral settings from 60 deg. right hand to 90 deg. left hand, and the latter from 90 deg. right hand to 60 deg. left hand. The illustration shows the machine with a right-hand swivel which is furnished unless contrary instructions are given. An automatic belt shifter is provided for stopping the machine after the hob has finished its work.

A chain-driven geared pump of 4 gal. per minute capacity is permanently attached to the machine. The coolant is strained through the chip pan and discharged into the sub-base. All pulleys and gears are covered by guards which comply with the law. Ample provision is made for changes of speeds and feeds. The belt drive is of the constant-speed type. The machine can be supplied with a cast-iron pan for a sub-base, making it into a bench machine, and when so mounted, can be driven from below. Special work spindles equipped with spring collets or floating chucks can be supplied.

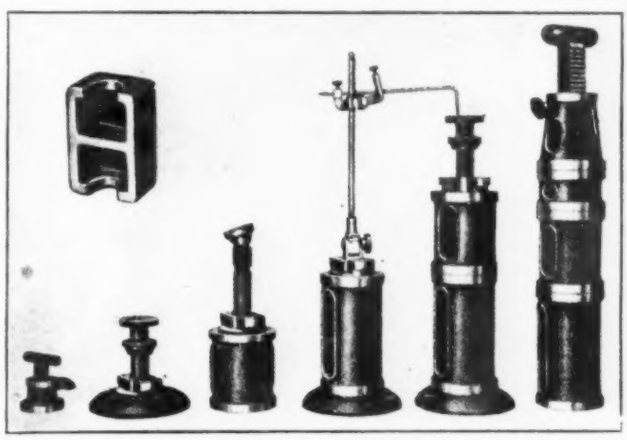


BARBER-COLMAN NO. 2 GEAR-HOBBING MACHINE

Specifications: Capacity, diameter, 3 in.; width of face, 7 in.; diametral pitch, 24 and finer; diameter hob spindle, ½ in.; maximum diameter hob, 1¼ in.; taper hole in spindle, No. 9 B. & S.; floor space, 27 in. by 42 in.; driving pulley, 6 in. by 1¾ in.; speed of driving pulley, 800 r.p.m.; number of changes of hob speed, eight; range of hob speeds, 200 to 800 r.p.m.; range of feed per revolution of work, 0.015 to 0.150 in.; net weight, 950 lb.; shipping weight (crated), 1200 lb.; shipping weight (boxed), 1360 lb.; measurements of box, 48 x 34 x 62 in.

Roberts Unit Jacks and Bolt Couplers

A useful and handy equipment for setting up and fastening work in position for drilling, slotting, planing and similar operations is showin in the illustration of the unit jacks and bolt couplers, made by the Roberts



ROBERTS UNIT JACKS AND BOLT COUPLERS

Manufacturing Co., 152-6 Brewery St., New Haven, Conn. This equipment is designed to supplant the usual miscellaneous assortment of bolts, clamps and blocking and will be found a convenient help for assembling and erecting work as well as for machining operations.

The jacks can be quickly built up to the desired height without the use of bolts or screws as lock joints connect each unit with a simple hair turn. Shimming is avoided by means of the screw adjustment and the jack, when set, is solid and free from the springy condition common to ordinary blocking. The jacks are provided

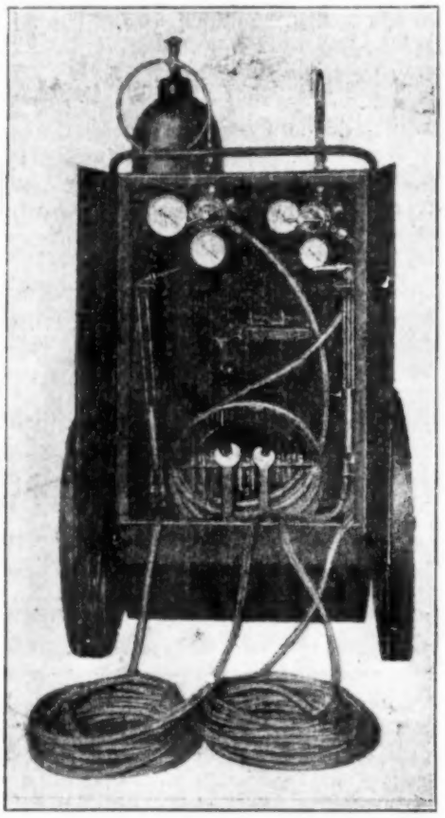
with different forms of tops, such as the universal milled head for angular surfaces, the round T support for straps and the tool-setting head that takes the place of parallels, or height gage, also the surface gage attachment that serves an obvious purpose. The bolt coupler saves the making of special bolts for unusual jobs as it can be used to join two bolts together to get the desired length.

The equipment is not intended for the tool room, but as part of the machine equipment. The jacks are made in several sizes having base diameters from 2¼ to 3 ½ in. and heights of 2 to 5 in. The extension units have varying lengths of 2 to 6½ in. The bolt couplers are made for all standard size bolts from ½ to 1⅛ inch.

Davis-Bournonville Cabinet Truck for Cutting and Welding Outfit

The Davis-Bournonville Co., Jersey City, N. J., has put on the market a cabinet truck for cutting and welding outfits as shown in the illustration. This device is intended to carry a complete outfit for gas cutting and welding which may be used direct from the truck.

An upright steel body or cabinet forms the body of the truck, the bottom of which projects as a platform to support an oxygen and either an ecetylene or hydrogen cylinder. The cylinders are held in place by chains which are linked over hooks in the cabinet and tightened by wing nuts. The cabinet is mounted on two wide wheels of large diameter having cast-iron hubs, steel spokes and tires. The cylinder platform is braced to the body by side straps extending over and above the cabinet, forming a handle bar. Two steel doors that lap when closed are provided with a suitable hasp for a padlock. The pressure regulators and gages are fixedly attached to the inside of the locker and are thus protected from handling or removal by others than the operator. Connections between regulators and cylinders are made by ¼-in. seamless brass coils attached to the top of the locker.



DAVIS-BOURNONVILLE CABINET TRUCK FOR CUTTING AND WELDING OUTFIT

Specifications: Width over all, 31 in.; depth, over all, 28 in.; height over all, without cylinders, 45 in.; height, over all, with cylinders, 56 in.; net weight without equipment, 163 lb.; net weight, with full equipment, 500 lb.; diameter of wheels, 24 in.; face of wheels, 2½ in.

The cabinet is so designed that when fully equipped the operator has only to open the doors, take down the torch, turn on and adjust the gases to be ready for work. On stopping work the reverse may be followed and when the doors are locked the outfit may be left with safety. The fittings comprise: spring clips to hold four torches; a tip rack with places for 17 tips and a half round frame on which to coil the hose. The bottom furnishes ample space for a supply of welding rods.

Provision is made for carrying the following equipment: One oxygen tank; one acetylene or hydrogen tank; one oxygen regulator with high- and low-pressure gages; one acetylene regulator with high- and low-pressure gages; one 3000-A cutting torch; five cutting tips, Nos. 1, 2, 3, 4 and 5; one 2018 straight cutting torch; three bent cutting tips, Nos. 2, 3 and 4; one 146 large C-welding torch; five 100 welding tips, Nos. 6, 7, 8, 9 and 10; one 453 small C-welding torch; five 99 tips, Nos. 1, 2, 3, 4 and 5; one 25-ft. length high-pressure standard corrugated oxygen hose; one 25-ft. length standard corrugated acetylene hose; two torch wrenches; one regulator wrench; one guide-roller cutting attachment; one spark lighter; one pair gauntlets; one pair goggles; one instruction book and one set pressure cards.

"Inaout" Double-Acting Collet

The Inanout Collet Manufacturing Co., 821 Lake Ave., Rochester, N. Y., has commenced the manufacture of a line of double-acting spring collet chucks. Fig. 1 shows the collet in section, and Fig. 2 shows some of the varied forms of chucks for use with the collets, also the adapters and draw-in rod.

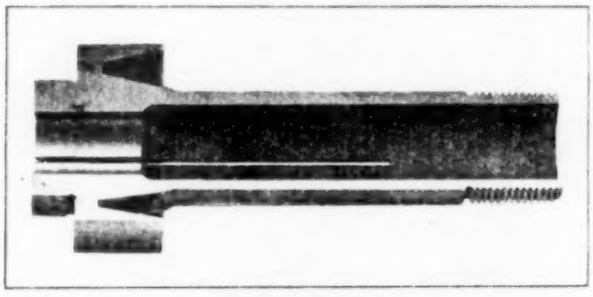


FIG. 1. THE COLLET

In addition to the regular closing taper, this collet

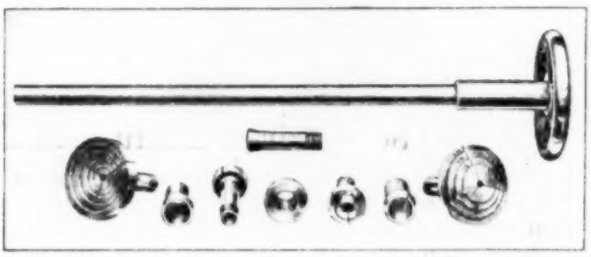


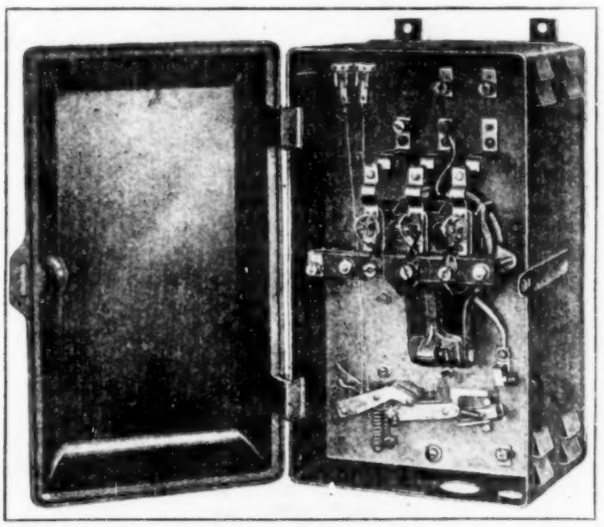
FIG. 2. THE DRAW-IN ROD AND SOME OF THE CHUCKS

is provided with an integral flange, on the inner surface of which there is a reverse or expanding taper, and the outer surface of the chuck is fitted with standard sized shoulders for holding internal work. By means of adapters which act either on the expanding or the closing tapers, the chuck may be expanded to grip internal work or contracted for gripping external work, according to which adapter is used.

Both the collets and chucks are made of tool steel, hardened and ground to standard sizes in the bore as well as on the steps. As will be seen in Fig. 2, multiple-step chucks for special purposes may be obtained. These collet chucks are made for use in any of the standard bench and toolroom lathes and if desired chucks will be furnished for holding special work. Special chucks may be had for holding threaded parts, either internally or externally.

"Alternating-Current Starting Switch"

It is customary and permissible to start small alternating-current motors by connecting them direct to the line. The rush of current, however, during the starting period has been a frequent source of trouble by blowing fuses. To overcome this difficulty, the Electric Controller and Manufacturing Co., Cleveland, Ohio, has brought out a push-button-operated a.-c. starting switch that is designed to protect the motor and at the



ALTERNATING-CURRENT STARTING SWITCH

same time prevent the blowing of fuses. The protective principle used consists of two wires conected to an auxiliary circuit-breaker. The expansion of these wires caused by an excessive flow of current will open the auxiliary circuit-breaker mechanically, and thus cause the main magnetic switch to open the line. To close the main switch again it is simply necessary to push the start button. A stop button is also provided for use when required. The motor can be started or stopped at will by manipulating the push-buttons.

Hergi Screwdriving Outfit

A power-driven outfit for driving and setting screws or nuts that is said to do the work of four men is a product of the Hergi Manufacturing Co., 75 Third St., Bridgeport, Conn. A feature of this equipment is that after the screw has been run down to the shoulder, a ratchet motion can be applied by the operator to set the screw to any desired degree. The device is automatic in operation. The screwdriving begins as soon as pressure is applied, and the power is shut off the instant pressure is released; and at the same time a pawl en-

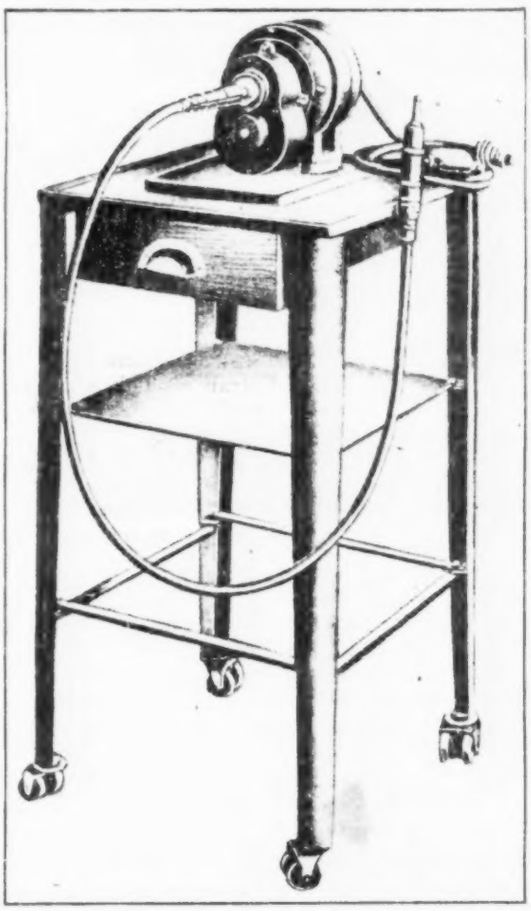


FIG. 1. HERGI PORTABLE SCREWDRIVING OUTFIT

gages the ratchet so as to permit the screw to be set The power control is all in the hand piece, a friction device being used to apply or release the power.

The equipment can be furnished in a number of sizes

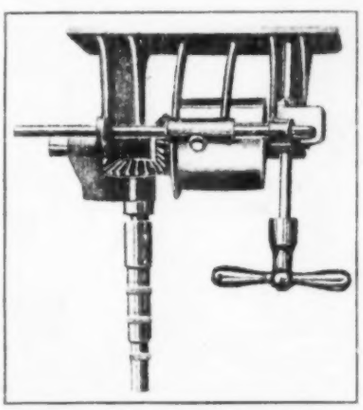


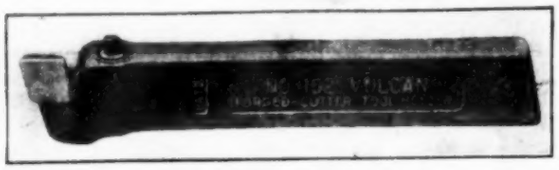
FIG. 2. SHOWING COUNTERSHAFT DRIVE AND HAND PIECE

and types. Fig. 1 shows a portable arrangement of the equipment, a flexible shaft being connected to a ¼-hp. motor through a reduction gear. Another form, Fig.

2, shows the device connected to an ordinary countershaft, or the motor can be screwed to the wall or ceiling. The various sizes will handle metal screws or nuts ranging in size from 3-16 to 5-8 inch.

Williams No. 102 "Vulcan" Forged Cutter Toolholders

These toolholders have been developed and introduced to meet the demand for the solid forged type of tool. The "Vulcan" system is a late addition to the "Agrippa" line manufactured by J. H. Williams & Co., Brooklyn, N. Y. The toolholder is said to be the same in principle as a solid forged tool, except that the cost is much less. It was first designed and used in the maker's shop many years ago. The holders are drop-forged from high-grade steel and heat-treated to develop maximum toughness. They are of simple con-



NO. 102 "VULCAN" FORGED CUTTER TOOLHOLDERS

struction, being composed of but three parts—holder, square-head cam, and locking pin. The line includes a wide range of sizes and types of cutters made from high-speed steel and adapted for any regular machining operation on a lathe, planing or shaping machine.

"Dalton Six" Type B6 Lathe

The type B6 lathe now being manufactured by the Dalton Manufacturing Corp., 1915 Park Ave., New York, differs materially from the type B4 that has been on the market for the past six years, although the same trade name "Dalton Six" is retained. The machine has standard dimensions, 8 ¼ x 36 in., and is furnished in a variety of styles such as bench lathes, full cabinet base semi-cabinet base, or with standard high legs and foot power drive. Individual motor drive is furnished for either the bench or floor type machine, arranged as shown in Fig. 1.

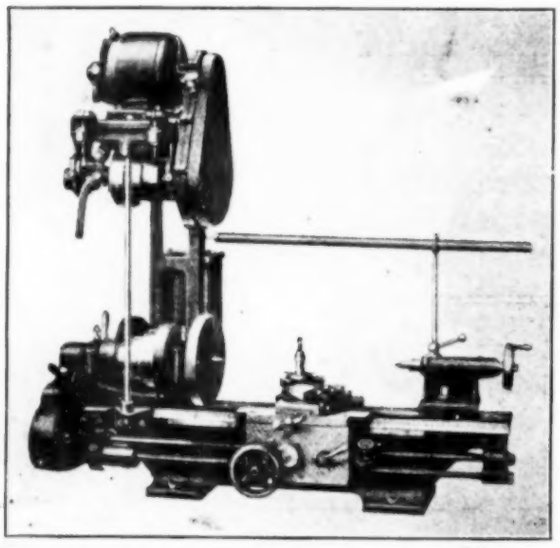


FIG. 1. "DALTON SIX" BENCH LATHE WITH INDIVIDUAL MOTOR DRIVE

Specifications: Swing over bed, 8¼ in.; over carriage, 5 in.; over rest, 1⅞ in.; between centers, 18½ in.; hole through spindle, 1 1/32 in.; Morse taper No. 2; length of bed, 37 in.; largest cone step, 5⅛ in.; width of belt, 1¼ in.; size fo motor, 1/3 hp. Gross weights are: Bench lathe, 340 lb.; with high legs, 465 lb.; semi-cabinet legs, 530 lb.; full cabinet, 640 lb.; bench lathe with motor drive, 550 lb.

With the cabinet base machine, Fig. 2, a single casting is used for bed and legs, thus securing extreme rigidity for a lathe of this type. The bed has flat ways, also a flat planed surface and T-slot at the back running the full length, to which any of the special attachments can be quickly clamped in position when needed. These attachments are for indexing, thread chasing, milling, grinding, taper work, and broaching. A quick-acting draw-in, automatic turret for the carriage is also an attachment as well as other devices necessary to a complete lathe equipment. They can be supplied either

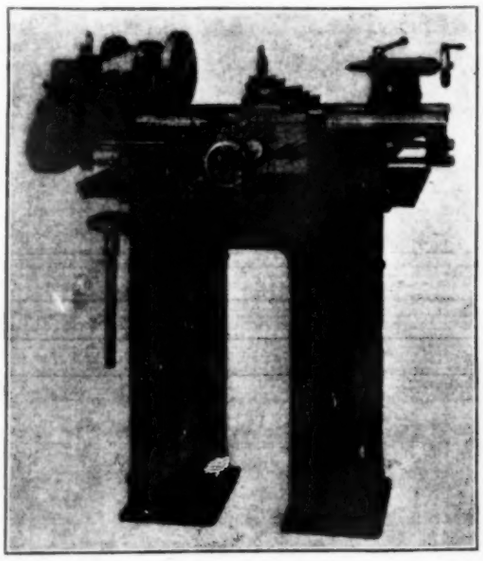


FIG. 2. "DALTON SIX" TYPE B-6 LATHE WITH FULL CABINET BASE

at the time of purchase or at a later date as all parts are made interchangeable. A special feature is the direct-connected grinding attachment.

Special countershafts for internal or external grinding at high speed are furnished when required. The spindle is drop-forged and has a collet capacity of ¾ in. The spindle nose, including the thread, is hardened and ground and has large ball-thrust bearings, also a push-button-operated locking device when using the back gears. The compound rest is offset 60 deg. and is graduated to 180 deg. The carriage has full-length bearings on the bed and is supplied with felt wipers. The carriage feed can be stopped at any given point by means of an adjustable automatic arrangement attached to the feed rod. The tool post, ring and wedge, are made from drop-forged steel and hardened. The tailstock is of the offset pattern having a spindle ground to size. The machine can be furnished with either English or metric lead screw or metric transposing gears.

King Face Masks

The Julius King Optical Co., 10-12 Maiden Lane, New York, N. Y., has lately put on the market a face mask for the protection of autogenous cutters and welders as shown in the illustration.

The masks are made of fibre and provision is made for a free circulation of air between the front and the face, not only keeping the operator cool, but prevent-

FIG. 1. KING FACE MASK WITH SIDE SCREENS
FIG. 2. KING FACE MASK WITHOUT SIDE SCREENS

ing the tendency of the lenses to fog. The masks are supported by bands over the head and it is said that weight is not apparent and that they are as comfortable to wear as a cap. Two styles are made—with and without side screens. The one without screens may be had with combination lenses tinted for acetylene welding or with any other tint for specific work. The one with side screens, providing side vision, is fitted either with combination lenses or with clear Saniglass lenses.

Strockbridge Shaping Attachment for Producing Irregular Surfaces

A shaping-machine for producing irregular or curved surfaces is being manufactured by the Stockbridge Machine Co., Worcester, Mass. The device should be very useful in the manufacture of special shapes and is particularly intended for the production of certain types of dies, bending and forming tools for forging work, also special forming tools or cams for automatics and other machines. From the illustration, Fig. 1, showing the attachment fitted to a standard shaping machine, it is apparent that ample adjustment is provided to accommodate a large variety and range of work. It may be further noted that the cutting tool is directly beneath the follower and is raised and lowered as the follower moves along the path of the templet and as a result reproduces its curves and angles, not only once, but over and over again, at one setting, or, if required, at some future time. The templet is made from ¼ in. stock and shaped to the required outline of surface to be duplicated. By using a special table the attachment can be made to serve special purposes such as beveling and concaving a surface at the same time.

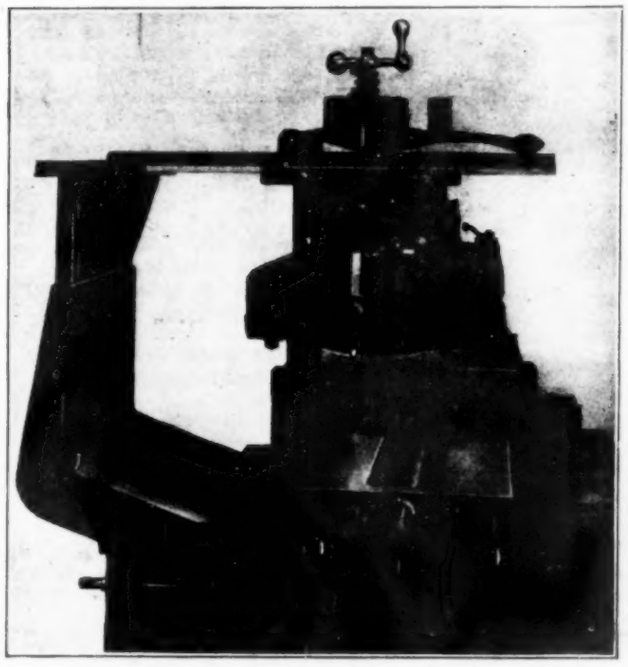


FIG. 1. STOCKBRIDGE SHAPING ATTACHMENT

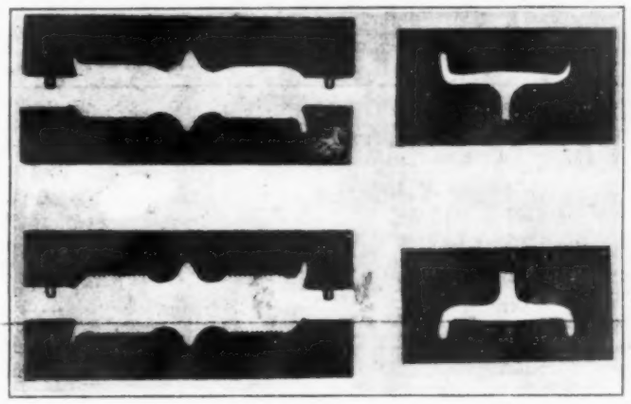


FIG. 2. CLASS OF WORK PRODUCED BY THE ATTACHMENT

Fig. 2 shows a few of the many shapes that may be machined with the attachment and indcates in a general way the possible variety of its works. The irregular surfaces of solid dies may be finished to advantage and with split dies duplication of surfaces made from the one form can be accomplished at a considerable saving over old methods. The attachment can be furnished for all sizes of this company's shaping machines.

Knief Company's Slide Rule

Slide rules are now considered almost a necessity to anyone making extensive calculations, particularly the engineering profession. Knief & Co., 4168 West 25th St., Chicago, Ill., who specialize as rule and scale makers, are manufacturing a standard Mannheim slide rule with a metal body instead of the usual wooden body.

KNIEF CO.'S SLIDE RULE

The metal used is nickel-silver, to which is glued the white celluloid graduated facings. The body or frame of the rule is die cast and guaranteed by the makers to be accurate and to remain so; also that the rule can be manufactured at a much lower cost than the wooden-frame rules.

Wolf New Process Abrasive Wheels

The Wolf New Process Co., 711 Hanover St., Meriden, Conn., is making abrasive wheels by what they claim to be a new and secret process, which enables them to make a free cutting wheel at a low cost. Any desired abrasive may be used, the company's process concerning only the bond and the modifications of methods of handling made possible by it. Wheels may be made of any size or shape within the limits of present commercial standards.

This is our delayed issue of Oct. 23, 1919. This news is however up to date, having been prepared for our Nov. 6 issue

Sparks from Industry's Forge

Edited by E. C. Porter

Trade Currents from Cleveland Machinery Districts

Improvement in machinery demand in the northern Ohio district is noted in nearly all branches of the industry about Cleveland in the last week. The rush of a couple of months ago has given way to more settled and normal conditions. Individual requirements are for one or two machines of different kinds and are coming from all sources, with the result that the outlook is more encouraging; this activity shows the general industrial situation is widespread in its movement.

Prospects for improvement in foreign demand, as far as this market is concerned, seemingly have disappeared. According to the leading interests in the Cleveland trade, representatives of American firms, who have gone to European countries, are now planning to return. It is claimed the policy of the American Government in offering to foreign consumers equipment from dismantled plants in this country is making a considerable inroad upon the possible new equipment business of manufacturers and dealers. Liberal terms upon which this used equipment is being offered make for competition, against which the producers do not care to go up against, it is claimed.

Meanwhile the steel strike, now about one month old, and more strictly enforced in the Cleveland district plants than in other steel producing centers, has not affected the machinery demand. Sufficient stock in the hands of the larger manufacturers and users of machinery is keeping their plants running, and unless the walkout is prolonged, no actual detriment to the machinery industry will be seen, it is believed. Most steel plants remain idle; workers remain away, with the exception of pickets, which is the latest move on the part of labor. In some industries allied to the steel interests, such as hardware firms and the like, the return of workers is claimed by firm heads. Similar industries in the State, including Cincinnati Sandusky, Akron, Canton, Dayton, Youngstown, Lima, Toledo, Marion, Elyria, Conneaut and Ashtabula, are continuing operations with surplus stocks of material. The continuance of these activities is believed to be a big influence on the continuance of the widespead machinery demand.

New projects for Cleveland, involving later requirements for equipment, continue to come forward. The latest is the announcement that the Fisher Body, Detroit, is negotiating for a tract of land here, whereon it proposes to erect the largest single unit for the manufacture of automobile bodies in the world. Representatives of the firm in town this week asserted that this firm expected to do a $50,000,000 business this year. The present plant of the company, a subsidiary of the General Motors Corp., employs 7,000 men. The proposed plant for Cleveland will require 1,500,000 sq. ft. of operating space. It is said the company has $20,000,000 orders to start business with.

The James Holan Manufacturing Co., making passenger and truck car bodies and parts, and the Holan Metal Products Co., are planning enlarged space for the manufacture of its products in quantities. These firms are now supplying local automobile manufacturers.

Remington Arms Company Will Manufacture Cutlery

The Remington Arms-Union Metallic Cartridge Co., located at Bridgeport, Conn., has started a portion of its massive plant, in the manufacture of cutlery. Although only a small part of the plant is at present being used on this work, the prospects are that within a very short while this line of work, together with other manufacturing of peace-time goods, will in a large measure supplant the war-time products of the factory. The machines for turning out bayonets for the foreign armies, will be used for turning out table knives and other cutlery. A slight change has made the machinery suitable for this use. A large number of employees will be kept busy on this work, it is expected, when the cutlery is fairly well started. Bullets, small arms and sporting cartridges are still being turned out at the plant, but with the war over not nearly the space is needed for this line of work as was needed to supply the needs of the allied governments with war supplies and munitions.

Purchasing Agents' Association Holds Its Monthly Meeting

The Purchasing Agents' Association of New York, comprising over three hundred buyers representing the largest industrial and manufacturing concerns in the vicinity, held its regular monthly meeting on Tuesday, Oct. 28th, at the Builders Exchange Club. The principal address of the evening was on current topics by Alfred W. McCann, pure food expert. The balance of the evening was devoted to open discussion on various problems connected with the purchasing profession. A large number of applications for membership were received for consideration.

Norton Company Buys Boat Club For Its Employees

The Norton Co., of Worcester, Mass., manufacturer of grinding machinery, has purchased the Lakeside boat club, just outside Worcester, and will use it as permanent quarters for the employees of the company. The company will make extensive alterations to the place during the winter months, and will also build a large up-to-date bathing house, which will have individual dressing rooms, shower baths, washrooms, etc. A laundry system will be established along with the bathing house so members can have their bathing suits, etc., well taken care of. A swimming pool, and wading pool, will also be constructed. A track and a grandstand for the use of the various athletic events staged by the company, under their athletic director, Carl F. Liefe, are also included in the plans. A cafeteria will be installed and when completed it will be surrounded with flower beds and other shrubbery. The new quarters are located on Lake Quinsigamond and will afford a pleasant and enjoyable place for the employees the year round.

Philadelphia Machine-Tool Market Not Affected By Strikes and High Prices

Strikes and prevailing high prices have not materially affected the Philadelphia machine-tool market. Large orders are not common, but manufacturers of almost every description are buying tools in small lots; and drilling machines, lathes, punching machines, and presses are in constant demand.

Large quantities of machine tools, collected for war production and since placed on the market, have failed to cause a decided weakening of prices. This is due to the fact that the Government has refused to flood the market at the dealers' expense and is unloading its equipment at prices about equal to those asked by the dealers.

The high price of labor has caused an unusual demand for second-hand tools, as many manufacturers have endeavored to balance a decrease in expenditure for equipment against excess wages.

China, Japan and Canada are constantly in the market for ship equipment and engines. Several inquiries have been received in this city and it is expected that Philadelphia will fill a large proportion of these orders.

Just at present the machine-tool future does not appear to be unusually bright, but with the adjustment of

labor trouble, the market should soon settle down to normal conditions.

The Luster Machinery Co. has moved to new and enlarged quarters and the Sherritt & Stoer Co., Inc. has let a contract to the William Steele and Sons Co. for the erection of a new office and storage building.

London Firm To Build Airplane Factory in Chile

The Holt Thomas Aircraft Manufacturing Co. of London is considering the establishment in Chile of a factory for the manufacture of airplanes primarily for commercial purposes, it was learned from reports reaching Washington.

It is understood the Chilean Minister to Great Britain and the Minister of War in Santiago have been in conference on this matter, and a representative of the British company was reported to be in consultation with the ministry of war and the commander of the Chilean air forces in working out the details of this project.

The announcement of the intentions of the British company has aroused much favorable comment in Chile, it is reported, because of the damaged conditions of the railways and roads, due to the severe storms of the past winter. The necessity for improvement in the means of communication has been keenly appreciated.

Plans are now under way, according to reports for the establishment of an aviation school in Rio de Janeiro. Representatives of the Caproni, Handley-Page and Farman companies are said to be already on the ground.

France and Belgium Large Purchasers of Surplus Machine Tools

Foreign orders for machine tools are flooding the machine-tool section of the Surplus Property Division of the War Department, the chief purchasers being France and Belgium.

Belgian representatives have already placed orders with the machine-tool section for 2400 machine tools of every description. Orders are also coming from France, but the exact number of tools ordered by that country was not known by officials of the machine-tool section.

In addition to the foreign orders, the domestic demand for the surplus machine tools of the War Department has been so great as to have already depleted practically the entire supply of new tools.

An inventory of the total number of machine tools still on hand is in the process of preparation by the War Department.

Chicago Holds Airplane Show

Airplanes for commercal use and pleasure will be displayed in the Coliseum during the week of Jan. 8. at Chicago's first aeronautical show which has the sanction of the Manufacturers' Aircraft Association.

Employees of Worthington Pump Co. To Have Clubhouse and Trade School

The Worhington Pump and Machinery Corp., operating the Deane Steam Pump Co., at Holyoke, Mass., is to have a clubhouse and trade school, in connection with its plant. The Corporation is planning to reconstruct the Parochial schoolhouse of the Immaculate Conception Church, which was damaged by fire about four years ago, and which adjoins the plant and is ideally located. This will enable the company to extend its program of welfare work among its employees, and will also provide additional educational and recreational facilities. The rebuilt school when completed will provide a large auditorium where the employees may hold dances, socials, etc. This auditorium will also have motion-picture apparatus and stage, basketball court, and gymnasium for other indoor sports. Superintendent Robert E. Newcomb, of the Deane works, states that the aim of the concern is to help the employees to help themselves and otherwise to help them in increasing their own efficiency in their trades.

DeLamater-Ericsson Memorial

The American Society of Mechanical Engineers with a large number of technical societies and civic organizations will hold a memorial meeting at 8 o'clock, the evening of Dec. 3rd, at the Engineer's Societies Building, 29 West 39th St., to commemorate the Phoenix Foundry which stood on West St. between Vestry and Laight Sts., 1838-1851, and the DeLamater Iron Works at the foot of West 13th St., 1851-1889, in both of which, under Cornelius H. DeLamater and Capt. John Ericsson, was developed the progress in Naval Architecture and Industrial Engineering which occurred during those years. Tablets will be erected on these sites. People who possess prints or documents relating to these works will confer a favor upon the committee by communicating with H. F. J. Porter, chairman, DeLamater-Ericsson Memorial, A. S. M. E., 29 West 39th St.

The Challenge Cutlery Corporation Insures Its Employees

The Challenge Cutlery Corp., of Bridgeport, Conn., manufacturer of cutlery, has taken a blanket insurance policy for its employees, numbering about 300. The policy was placed with the Connecticut General Life Insurance Co., of Hartford, Conn., and calls for insurance from $500 for two to six months' service with the company, to $2000 for those who have been with the firm for 11 years, or over. A big proportion of the employees come in the $2000 class, as most of them have been in the employ of the company for over 11 years. The various classes are listed as follows: for workers in the employ of the company up to six months, $500; between six and nine months, $650; between nine and 12 months, $800; over one year, $1,000; and for each year of work thereafter $100 increase until reaching the maximum of $2000 for 11 years of service with the company. If the employee becomes permanently unfit for further work, he is entitled to the full insurance, the same as when death occurs. There is no extra charge for this insurance to the employee, and remains in force as long as he remains with the company. The Challenge Cutlery Corp. was incorporated in 1899.

Personals

C. W. De Mott has been appointed representative of the New England states for the Hart-Parr Co., Charles City, Iowa.

Joseph H. Hazley is now associated with the Jacobs Manufacturing Co. Hartford, Conn.

Mr. Hare has resigned as Director of Sales at Washington. Mr. Morse will take his place.

Frank Bryant has been appointed general sales manager of the recently organized Plowman Tractor Co., Waterloo, Iowa.

C. W. Cross has been appointed manager of the Chicago Pneumatic Tool Co's. western railroad sales with headquarters at the Fisher Building, Chicago, Ill.

Leslie E. Freeman has been appointed by the American Chamber of Commerce for Brazil, resident representative of the Chamber in the United States.

G. E. Anderson, formerly assistant to the vice president of the American Locomotive Co., has been appointed assistant Eastern sales manager of the Duff Manufacturing Co. with headquarters at its Eastern sales office, 50 Church St., New York City.

Frank J. Hadish has resigned as secretary of the Waterloo Manufacturer's Association, Waterloo, Ia., and F. P. Simmons has been appointed as his successor. Mr. Hadish will be sales manager for the new factory, George B. Miller & Son Manufacturing Co., Waterloo, Iowa.

Herbert J. Flagg, formerly Captain of Coast Artillery, was appointed to the position of chief engineer of the Public Service Commission of Washington, D. C., to take the place of D. F. McCurrach who resigned to enter private practice along appraisal and rate-making lines. Captain Flagg has been on the engineering staff of the commission since 1915.

Albert H. Mitchell has become associated with H W. Cotton, Inc., of Brooklyn, N. Y., as vice president and general sales manager, with headquarters at its New York office in the Woolworth Building. Mr. Mitchell was formerly with the Taft-Peirce Manufacturing Co., Woonsocket, R. I., for the past nine years having been in its engineering department at Woonsocket, after which he entered the sales department as

Chicago representative. For the last five years he has been in its New York Office as district sales manager.

Robert F. Herrick, president of the Reed-Prentice Co., Worcester, Mass., manufacturer of machine tools and machinery, will leave shortly for Europe on a general business trip.

William G. Hume has been selected as assistant superintendent of the Lamson and Goodnow Manufacturing Co., of Shelburne Falls, Mass., manufacturer of all kinds of cutlery. Mr. Hume succeeds Jacob M. Haigis.

John V. Gillespie and F. A. Frommann, well known in the machinery industry of the northern Ohio district, have been appointed to the sales staff of the Cleveland Tool and Supply Co. They will travel northern Ohio, Mr. Gillespie in the eastern half, and Mr. Frommann in the western section.

E. V. Wenzill, who was formerly with the Norton Grinding Co., of Worcester, Mass. has been made manager in Chicago and vicinity for the grinding-machine department of the Modern Tool Co., of Erie, Penn. Mr. Wenzill has been doing grinding-machine work in France, for the past several months.

George M. Johnstone, of Clinton, Mass., has been appointed production manager of the Clinton plant of the Clinton-Wright Wire Co., operating plants at Worcester, Clinton and Palmer, Mass., in the manufacture of heavy wire and wire goods and specialties. Mr. Johnstone was formerly manager of the stores department at this plant.

Edward R. Abbott has joined the sales force of H. W. Cotton, Inc., of Brooklyn, N. Y. He will have charge of the Western business making his headquarters for the present in the Woolworth Building, New York City and later in Cleveland, Ohio. Mr. Abbott was formerly with the Taft-Peirce Manufacturing Co., Woonsocket, R. I., as a member of the sales force of its New York office for several years.

R. Sanford Riley, president of the Sanford Riley Stoker Co., Ltd., of Worcester, Mass., manufacturer of mechanical stokers, has returned to his home in Worcester after a three months' visit in European countries, including England, Ireland, Scotland, Belgium, Germany and France. Mr. Riley's trip was made to attend to matters relative to European concerns who wanted license to manufacture and sell the "Sanford Riley" stokers. Mr. Riley is also the president of the Worcester Chamber of Commerce.

Carl F. Dietz, vice president and general sales manager of the Norton Co., manufacturer of grinding wheels and grinding machinery, Worcester, Mass., and F. A. Emery, who is assistant to vice president and foreign manager Neilson, sailed from New York City on the Holland-American line, Oct. 4. Mr. Dietz will be gone for a period of 10 weeks on a business trip through several European countries to establish new agencies for the Norton Co. Mr. Emery will remain in London, having charge of the foreign distribution department.

Business Items

The Woodlawn Machine Screw Co., located at Newell and Thurston Aves., Pawtucket, R. I., has disposed of its business, and has sold its real estate to Lang & Hoffman, silk manufacturers, New York.

The Hobbs Manufacturing Co., of Worcester, Mass., has appointed William F. Ling as the western representative for their lock washer line with headquarters at Detroit. This office will cover Cleveland Columbus, and vicinity.

The Moore Drop-Forge Co., 38 Walter St., Springfield, Mass., has bought out the Page-Storms Drop-Forge Co., of Chicopee, Mass., and will operate both plants under the old name of the Moore Drop-Forging Co., with the main office in Springfield.

Armstrong Bros. Tool Co. of Chicago are making extensive additions to its plant buildings and equipment. The new buildings include an addition to the drop forge department, a new building for the hardening and heat treating department and a new reinforced concrete building for the general office, finished stock and shipping department.

The Whitin Machine Co., of Whitinsville, Mass., manufacturer of cotton-mill machinery, castings, etc., is erecting another two-story and basement boarding house for its employees. It will be of timber and stucco exterior, 131 x 42 ft., and will house about 50 sleeping rooms. It will also include an assembly hall, with social and amusement rooms. The company has just completed a two-story 100 x 50 ft. boarding house and several cottages for the use of its workmen.

Obituary

Peter Kettenring, founder of the Defiance Machine Works, died at his home in Defiance, Ohio, on Oct. 8, 1919. He was 84 years old.

James R. Fletcher, for the last 12 years factory manager of the P. & F. Corbin Division of the American Hardware Corp., of New Britain, Conn., died at his home in New Britain, Sept. 13.

Charles Joseph McMyler, director for many years in the McMyler Interstate Co., died at his residence in Cleveland during the week of Sept. 22. He was the son of John McMyler, founder of the business. He had not been active in the company for the last three years.

Frank G. Goodale, 45 years old, died at his home in Worcester, Mass., recently, after a brief illness. He was mechanical engineer and superintendent for the last 13 years at the plant of the Parker Wire Goods Co., Worcester, Mass. Previous to that he was employed at the plant of the American Steel and Wire Co., Worcester, Mass.

George Clark Edwards, founder of the Bridgeport Chain Co., located at Bridgeport, Conn., died at his home in Bridgeport on Sept. 23 at the age of 73 years. The deceased was also vice president of the International Silver Co., with main office at Meriden, Conn., and operating many plants in Connecticut. Mr. Edwards was born in Waterbury, Conn. 1846.

Catalogs Wanted

A. R. Kelso, mechanical engineer of the Willys Corp., Elizabeth, N. J., desires a complete file of catalogs of machinery, tools and supplies for machine-shop, tool and stamping divisions.

New Publications

Location of Starting and Lighting System Troubles. By Victor W. Page. Chart, 24 x 38 in. Published by Norman W. Henley Publishing Co., 2 to 6 West 45th St., New York. Price, 50 cents.

This chart or wall hanger has large, plain, illustrations showing all the various components of an automobile starting and lighting system. They are arranged in such a way that even a novice can easily follow the directions. These directions, while ample, are clear and to the point without wasting words. By the use of this chart the various troubles the motorist encounters with his wiring, lamps, generator, switches or other parts, are easily located and overcome satisfactorily. It will be found of use to anyone having to do with automobile starting or lighting systems, whether professionally or occasionally.

Trade Catalogs

Bucket Cranes. Whiting Foundry Equipment Co., Harvey, Ill. This is a four-page folder illustrating the company's bucket cranes in operation; specifications will be sent upon request.

Sanford Vise. The F. C. Sanford Manufacturing Co., Bridgeport, Conn. Circular; pp. 3; 11 x 8½ in. This vise is composed of cast, machine, tool and nickel steel and is made for the heay work on a triple back-geared milling machine.

Forgings. Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Bulletin No. 1538; pp. 17; 10½ x 8 in. This bulletin shows illustrations of the forge and machine-shop equipment used in the production of forgings in the company's plant.

Thrust Bearings. Albert Kingsbury, Pittsburgh, Penn. Catalog; pp. 36; 9 x 6 in. A general description of the oil used, test result and wear of thrust bearing is given; also illustrations of types with descriptions.

Lubricating Oil Outfits. S. F. Bowser and Co., Inc., Fort Wayne, Ind. Circular; pp. 6; 13 x 7 in. This circular describes and illustrates the economical methods of handling oil that increases efficiency and adds to safety.

Air Compressors. Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Bulletin No. 1105; pp. 7; 10½ x 8 in. A general description of the design, building and operation of its air compressors is given.

The Pyrograph. Davis-Bournonville Co., Jersey City, N. J. Catalog; pp. 6; 11 x 8½ in. The pyrograph is a boiler-cutting machine for trimming and beveling boiler sheets to the correct flange height; its capacity is also included.

Thread Miller Nos. 1 and 2. Smalley-General Co., Bay City, Mich. Circular; pp. 4; 11 x 8½ in. In this circular are shown specifications and illustrations of two Smalley thread milling machines. These machines are especially adapted to milling threads, hitherto cut by other methods.